

**Black & Veatch Waste Science, Inc. (BVWS)  
Site Health and Safety Plan (Site HASP)**

**American Chemical Services, Inc. Site  
Remedial Design/Expedited Remedial Action Oversight**

US EPA RECORDS CENTER REGION 5



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# Health and Safety Plan

## American Chemical Services, Inc. Site

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- Appendix A    Task Health and Safety Plan

## Acronyms and Abbreviations

Abs	Skin absorption
ACGIH	American Conference of Governmental Industrial Hygienists
ACP	Access control point
ACS	American Chemical Services, Inc.
ANSI	American National Standards Institute
APR	Air-purifying respirator
bls	below land surface
BTEX	benzene, ethylbenzene, toluene and xylene
BVWS	Black & Veatch Waste Science Inc.
cPAHs	Carcinogenic polynuclear aromatic hydrocarbon
CAS	Chemical Abstracts Service
CFR	Code of Federal Regulations
CNS	Central nervous system
Con	Skin and/or eye contact
CPR	Cardio-pulmonary resuscitation
CRC	Contamination reduction corridor
CVS	Cardiovascular system
db	Decibel
DOT	Department of Transportation
FID	Flame ionization detector
GI Tract	Gastrointestinal tract
HASP	health and safety plan
HSM	health and safety manager
IDLH	Immediately dangerous to life or health
Ing	Ingestion
Inh	Inhalation
LEL	Lower explosive limit
mg/kg	milligrams per kilogram
MGP	manufactured gas plant
MSDS	Material safety data sheet
MSHA	Mine Safety and Health Administration
NE	No evidence could be found for the existence of an IDLH
NIOSH	National Institute for Occupational Safety and Health
OSHA	Occupational Safety and Health Administration
OSHA PEL	Occupational Safety and Health Administration Permissible Exposure Limit
OVA	Organic vapor analyzer
PAH	Polynuclear aromatic hydrocarbon
PCH	Polynuclear aromatic hydrocarbon, non-carcinogenic

PCB	Polychlorinated biphenyl
PEL	Permissible exposure limit
PID	Photo ionization detector
PM	project manager
PNS	Peripheral nervous system
PPE	Personal protective equipment
PPM	Parts per million
PVC	polyvinyl chloride
RA	Remedial action
RBC	Red blood cell
RCRA	Resource Conservation and Recovery Act
REL	recommended exposure limits
RI	Remedial investigation
SARA	Superfund Amendments and Reauthorization Act
SCBA	Self-contained breathing apparatus
SSC	Site safety coordinator
skin	Danger of cutaneous absorption.
TLV	Threshold limit value
TWA	Time-weighted average exposure concentration for normal 8-hour (TLV, PEL) or up to a 10-hour (REL) workday and 40-hour workweek
USEPA	United States Environmental Protection Agency
UST	underground storage tank
VDS	Vehicle decontamination station



## **1.0 Introduction**

### **1.1 Purpose**

This Site Health and Safety Plan (HASP) will establish the site specific health and safety guidelines and procedures for activities at the American Chemical Services, Inc. (ACS) site. The HASP will be based on existing data and site reconnaissance and will be in accordance with Occupational Safety and Health Administration (OSHA) regulations. The HASP will be approved by the Black & Veatch Waste Science, Inc. (BVWS) health and safety manager (HSM) or designee.

### **1.2 Scope**

Specific information or procedures that are applicable to all operations and tasks at the site are included in Sections 1.0 through 9.0 of the HASP. These procedures are applicable to all site activities unless otherwise stated in Appendix A, which addresses specific tasks and operations to be performed at the ACS site and details the hazards and control measures. Appendix A will be referred to as the task-specific health and safety plan (Task HASP).

### **1.3 Compliance with HASP**

Consistent with the contents of this Site HASP, work will be conducted in a safe and environmentally acceptable manner and all BVWS personnel and subcontractors contractually under this site HASP shall be required to comply with the health and safety requirements specified herein. All field personnel under this plan are required to read and familiarize themselves with the contents of this Site HASP and the associated Task HASP. Field personnel will document this competency through the entry of a signature and date as specified in the Certification Section (Section 11.0) in this Site HASP and Task HASP related to the work being performed. Subcontractors who are not contractually under this Site HASP are responsible to develop and implement a Site HASP that will interface with this Site HASP.

## **2.0 Site Background**

### **2.1 Facility Description**

The ACS site is located in Griffith, Indiana. Developed land around the site is used for single family residences and industrial purposes. The site is located at and near 420 South Colfax Avenue, Griffith, Indiana, and includes the 19-acre ACS property, the 2-acre Pazmey Corporation property (formerly Kapica Drum, Inc., and now owned by Darija Djurovic), and the 15-acre inactive portion of the Griffith Municipal Landfill.

### **2.2 Status**

The ACS facility and the Griffith Municipal Landfill are active. The Pazmey Corporation property (formerly Kapica Drum, Inc., and now owned by Darija Djurovic) is inactive.

### **2.3 Summary of Previous Site Activities**

ACS began operations in 1955 as a solvent recovery firm. ACS was later involved in chemical manufacturing and operated for a limited time as a Resource Conservation and Recovery Act (RCRA) facility. Several areas of the property were used for disposal of hazardous wastes. In 1990, ACS ceased solvent reclaiming activities after losing interim status under RCRA. Today, ACS operates as a chemical manufacturer.

A Record of Decision (ROD) was issued by USEPA on September 30, 1992. The major components of the selected remedy include:

- Groundwater pump and treatment system to dewater the site and to contain the contaminant plume with subsequent discharge of the treated groundwater to surface water and wetlands.
- Fencing the site and implementing deed and access restrictions and deed notices.
- In-situ vapor extraction pilot study of buried waste in the onsite area.
- Excavation of approximately 400 drums in the onsite containment area for offsite incineration.

- Excavation of buried waste materials/source areas and treatment by low temperature thermal treatment (LTTT). Treatment residuals meeting performance standards will be placed onsite.
- Onsite treatment or offsite disposal of treatment condensate.
- Vapor emission control during excavation and possible immobilization of inorganic contaminants after LTTT.
- Offsite disposal of miscellaneous debris.
- In-situ vapor extraction of contaminated soils.
- Continued evaluation and monitoring of wetlands and, if necessary, remediation of wetlands.
- Long term groundwater monitoring.
- Private well sampling with possible well closures or groundwater use advisories.

The USEPA was unable to secure a voluntary settlement with the potentially responsible parties (PRPs); however, USEPA issued a unilateral administrative order (UAO) for remedial design/remedial action (RD/RA) on September 30, 1994, to the Respondents. The PRPs have indicated that their intention is to comply with the terms of the UAO.

## 2.4 Nature and Extent of Hazardous Materials

Investigation activities have been conducted at the ACS site from 1989-1994. The activities have indicated the presence of contaminated groundwater, soil and other sources. Contamination in the surface soils (i.e., primarily polychlorinated biphenyls (PCBs)) was observed in the area of the site west of the fire pond. Contamination in the surface and subsurface soils, (including drums and other source materials) have been observed in the onsite-containment area, the off-site containment area, and the spill bottoms area.

The baseline risk assessment identified the following chemicals of concern in groundwater.

- |                      |                           |
|----------------------|---------------------------|
| • Chloromethane      | • Bis(2-chloroethyl)ether |
| • Vinyl Chloride     | • 1,4-Dichlorobenzene     |
| • Methylene Chloride | • 4-Methylphenol          |
| • Acetone            | • Isophorone              |
| • 1,1-Dichloroethane | • Pentachlorophenol       |

- 1,2-Dichloroethene (cis-)
- 2-Butanone
- Trichloroethene
- Benzene
- 4-Methyl-2-Pentanone
- Tetrachloroethene
- Ethylbenzene
- Bis(2-ethylhexyl)phthalate
- Polychlorinated Biphenyls (PCBs)
- Arsenic
- Beryllium
- Manganese
- Thallium

The baseline risk assessment identified the following chemicals of concern in soil.

- Chloroethane
- Vinyl Chloride
- Methylene Chloride
- Acetone
- 1,2-Dichloroethane
- 1,2-Dichloroethene (cis-)
- 2-Butanone
- Trichloroethene
- Benzene
- 4-Methyl-2-Pentanone
- Tetrachloroethene
- Styrene
- 1,1-Dichloroethene
- Carbon Tetrachloride
- Chloroform
- 1,2-Dichloropropane
- Toluene
- 1,1,1-Trichloroethane
- 1,1,2,2-Tetrachloroethane
- Chlorobenzene
- Xylene
- Antimony
- Cadmium
- Chromium
- Lead
- Bis(2-chloroethyl)ether
- 1,4-Dichlorobenzene
- cPAHs
- Isophorone
- Pentachlorophenol
- Bis(2-ethylhexyl)phthalate
- PCBs
- 2,4-Dinitrotoluene
- Hexachlorabutadiene
- Hexachlorobenzene
- n-Nitrosodiphenylamine
- 2,6-Dinitrotoluene
- Naphthalene
- Di-n-butylphthalate
- 1,2,4-Trichlorobenzene
- Aldrin
- 4,4,4-DDD
- 4,4,4-DDE
- 4,4,4-DDT
- Heptachlor Epoxide
- Endosulfan I
- Alpha-BHC
- Gamma-BHC
- Beta-BHC

## **3.0 Hazard Assessment**

### **3.1 Chemicals of Concern**

Chemicals of concern (COCs) commonly found on the American Chemicals, Inc. site are listed in Attachment 2. The table lists the allowable exposure levels for the chemicals, sign and symptoms of exposure, dermal absorption hazards, carcinogenicity, immediately dangerous to life and health (IDLH) values, health hazards, physical hazards, Chemical Abstracts Service (CAS) registry numbers and physical characteristics. Task specific information related to the chemicals of concern are listed in the appropriate Task HASP.

When COC concentrations exceed 1% or 0.1% for a carcinogen, a Material Safety Data Sheet (MSDS) will be provided in Attachment 3, in accordance with Section 8.6.4. (Hazard Communication) of the Site HASP. The MSDS's may not be from the specific manufacturer, distributor or potentially responsible parties that deposited the COCs. Although these are written by a specific manufacturer, they are not meant in any way to suggest that the waste products or contamination on the site come from that particular manufacturer. They are intended to be used solely as an approximation for the waste product to provide safety and health hazard information, including symptoms of exposure, first-aid procedures and spill control measures.

## **4.0 Personnel Qualifications**

### **4.1 Training Requirements**

All personnel who will be engaged in hazardous waste operations must present to the site safety coordinator (SSC) a certificate of completion for an initial 40-hour hazardous waste operations training course or the most recent certificate of completion for an 8-hour refresher course. The course must have been completed within the 12 months of the individual being onsite performing hazardous waste operations. The training must comply with OSHA regulations found at 29 Code of Federal Regulations (CFR) 1910.120(e). The certification must be presented to the SSC before site activities begin.

All personnel must complete a minimum of three days on-the-job training under the direct supervision of a qualified SSC or site supervisor before they are qualified to work at a hazardous waste site unsupervised.

Consistent with OSHA 29 CFR 1910.120 paragraph (e)(4), individuals serving in a supervisory role, such as the field team leader or SSC, require an additional 8 hours of training. BVWS individuals functioning in a SSC capacity shall also have at least 6 days of experience at the level of protection planned for in this site HASP. A SSC qualified at a given level of protection is also qualified as a SSC at a lesser level of protection.

At least two people will be trained and currently certified in first aid and adult cardiopulmonary resuscitation (CPR).

Personnel who use air supplied respirators must provide the HSM written certification that they have been trained in the proper use, inspection, emergency use and limitations of the equipment by a competent person. The training must be current within 12 months prior to the use of the equipment.

Personnel who participate in permitted confined space entry, radiation work, asbestos work or work involving lockout/tagout of energy sources must provide the HSM written certification that they have been trained in accordance with the applicable OSHA regulations before performing such work.

Personnel who use health and safety monitoring equipment other than the type and model provided by the BVWS equipment center must provide written certification to the HSM that they have been trained in the use, maintenance,

calibration and operation of the equipment by a competent person before using the equipment.

#### **4.1.1 Safety Meetings**

Safety meetings with all team members will be conducted prior to initiating any site activity. In addition, periodic briefings will be held throughout the project, especially when unsafe practices are noted or a change in site conditions require modifications of the HASP. Periodic meetings will be held at least weekly. Similar meetings will be held with individuals who later become a part of the field team before they take part in site activities.

The Safety Meeting Checklist in Attachment 4 provides a guide of topics to be covered during the initial briefing and may be covered during periodic meetings. The Safety Meeting Checklist will be used to document the safety meeting topics discussed and attendance.

The SSC is responsible for conducting and documenting the safety meetings.

## **4.2 Medical Surveillance Program**

All personnel who participate in hazardous waste site investigations will be enrolled in a medical monitoring program prior to initiating site activities. The medical monitoring program will consist of an initial baseline examination, periodic monitoring examinations and an exit examination.

All personnel who will be engaged in hazardous waste operations must present to the SSC a certificate of completion of a comprehensive medical monitoring examination. The medical examination must have been completed within 12 months prior to the beginning of site activities.

As a minimum, the medical monitoring examination will include the following elements listed in Attachment 5.

Site specific medical monitoring examinations or tests may be required to augment the standard examinations. Any additional examinations or tests required will be listed under the Site Specific Medical Monitoring Requirements section of the Task HASP.

Personnel who have the potential to wear respirators must present to the SSC a written documentation that a physician has determined that they are physically able to perform the work and use the respirator.

## 5.0 Personal Protective Equipment

### 5.1 General

All site activities require the following personal protective equipment (PPE) to be worn as a minimum.

- Safety glasses with sideshields meeting the requirements and specifications of the current ANSI Z87 standard.
- Steel-toed boots meeting the requirements and specifications for class 75 occupational foot protection of the current ANSI Z41 standard.

The following PPE shall be provided, used and maintained in a sanitary and reliable condition whenever it is necessary by reason of hazards of processes or environment, chemical hazards, radiological hazards or mechanical irritants encountered in a manner capable of causing injury or impairment in the function of any part of the body through absorption, inhalation or physical contact.

- Suitable eye protectors.
- Head protection.
- Extremities protection.
- Protective clothing.
- Shields and barriers.
- Face protection.
- Respiratory protection.
- Hearing protection.

### 5.2 Chemical Protective Equipment

#### 5.2.1 Levels of Protection

Personnel will wear chemical protective equipment when activities involve known or suspected atmospheric contamination, when airborne vapors, gases or particulates may be generated by site activities or when direct contact with skin-affecting substances may occur.

The specific level of protection and necessary components for each have been divided into four categories according to the degrees of protection afforded:

**Level A:** Should be worn when the highest level of respiratory, skin and eye protection is needed.



Note: BVWS personnel are not authorized to work at Level A without additional training and written approval from the BVWS HSM.

- Level B:** Should be worn when the highest level of respiratory protection is needed, but a lesser level of skin protection. Level B is the primary level of choice when encountering unknown environments.
- Level C:** Should be worn when the criteria for using air-purifying respirators are met and a lesser level of skin protection is needed.
- Level D:** Should be worn as a basic work uniform and not in any area with respiratory or skin hazards. It provides minimal protection against chemical hazards.

### **5.2.2 Chemical Ensembles**

The following are the standard chemical protective equipment to be used for all hazardous waste operations. Combinations of chemical protective equipment other than those described for levels A, B, C and D protection may be more appropriate and may be used to provide the proper level of protection. Deviations from this standard must be addressed in the Task HASP.

#### **Level B PPE:**

- Supplied-air respirator (MSHA/NIOSH approved). Respirators may be positive pressure-demand, self-contained breathing apparatus (SCBA) or positive pressure-demand, airline respirator (with escape bottle for IDLH or potential for IDLH atmosphere).
- Hooded chemical-resistant one-piece suit (Saranex/Tyvek) with double bonded seams.
- Long cotton underwear (optional).
- Outer gloves, chemical-resistant (11 mil nitrile).
- Inner gloves, chemical-resistant (4 mil nitrile or PVC).
- Boots, chemical-resistant, steel toe and steel shank.
- Outer boot covers, chemical-resistant, disposable.
- Faceshield (optional).
- Hardhat.

### **Level C PPE:**

- Air Purifying respirator (MSHA/NIOSH approved) with an organic vapor/acid gas/high efficiency particulate filter cartridge.
- Chemical-resistant one or two-piece suit (Saranex/Tyvek) with double bonded seams.
- Long cotton underwear (optional).
- Outer gloves, chemical-resistant (11 mil nitrile).
- Inner gloves, chemical-resistant (4 mil nitrile or PVC).
- Boots, chemical-resistant, steel toe and steel shank.
- Outer boot covers, chemical-resistant, disposable.
- faceshield (optional).
- Hardhat.

### **Level D PPE:**

- Tyvek, coveralls with long sleeves or equivalent.
- Boots, steel toe and steel shank.
- Outer boot covers, chemical-resistant, disposable.
- Outer gloves, chemical resistant (11 mil nitrile).
- Inner gloves, chemical resistant (4 mil nitrile).
- Hardhat.

## **5.3 Hazards and Protection Level**

The types of hazards for which levels A, B, C and D protection are appropriate and described below:

### **I. *Level A*-Level A protection should be used when:**

- A. The hazardous substance has been identified and requires the highest level of protection for skin, eyes and the respiratory system based on either the measured (or potential for) high concentration of atmospheric vapors, gases or particulate; or the site operations and work functions involve a high potential for splash, immersion or exposure to unexpected vapors, gases or particulate of materials that are harmful to skin or capable of being absorbed through the skin.
- B. Substances with a high degree of hazard to the skin are known or suspected to be present and skin contact is possible.

- C. Operations are being conducted in confirmed, poorly ventilated areas and the absence of conditions requiring level A have not yet been determined.

II. *Level B*-Level B protection should be used when:

- A. The type and atmospheric concentration of substances have been identified and require a high level of respiratory protection, but less skin protection.
- B. The atmosphere contains less than 19.5 percent oxygen.
- C. The presence of incompletely identified vapors or gases is indicated by a direct reading organic vapor detection instrument, but vapors and gases are not suspected of containing high levels of chemicals harmful to skin or capable of being absorbed through the skin.

Note: This involves atmospheres with IDLH concentrations of specific substances that present severe inhalation hazards and that do not represent a severe skin hazard; or that do not meet the criteria for use of air-purifying respirators.

III. *Level C*-Level C protection should be used when:

- A. The atmospheric contaminants, liquid splashes or other direct contact will not adversely affect or be absorbed through any exposed skin.
- B. The types of air contaminants have been identified, concentrations measured and an air-purifying respirator is available that can remove the contaminants.
- C. All criteria for the use of air-purifying respirators are met.

IV. *Level D*-Level D protection should be used when:

- A. The atmosphere contains no known hazard.
- B. Work functions preclude splashes, immersion or the potential for unexpected inhalation of or contact with hazardous levels of any chemicals.

## **5.4 Reassessment of Protection Level**

The level of protection provided by PPE selection shall be upgraded or downgraded based upon a change in site conditions or findings of investigations. When a significant change occurs, the hazards should be reassessed. Some indicators of the need for reassessment are:

- Airborne concentrations of chemicals or physical hazards exceed action levels.
- Commencement of a new work phase, such as the start of drum sampling or work that begins on a different portion of the site.
- Change in job tasks during a work phase.
- Change of weather.
- When temperature extremes or individual medical considerations limit the effectiveness of PPE.
- Contamination other than those previously identified are encountered.
- Change in ambient levels of contaminants.
- Change in work scope which effects the degree of contact with contaminants.
- Detection of contamination by instrument, odor or sight.

## **5.5 Inspection of PPE**

The user of the PPE is responsible for inspecting the equipment prior to immediate use. The PPE will not be used if the user is not familiar with the equipments limitations.

The user's buddy is responsible for periodically checking on the proper use of the protective equipment while in use.

## **5.6 Respiratory Protection**

Respiratory protection at hazardous waste sites consists of a fullface air purifying respirator as a minimum.

Any use of an air supplied system will be specifically addressed in the Task HASP.

Personnel will not be assigned to tasks requiring use of respirators unless it has been determined that they are physically able to perform the work and use the

equipment. The determination will be documented in writing and provided to the SSC in accordance with Section 4.2.

Personnel who have the potential to wear the respirator onsite must be trained in the proper use of the respirators and their limitations. The training will allow users to handle their respirator to become familiar with all components, select the proper size for a comfortable fit, wear it in normal air to become used to the breathing resistance, visibly conduct a critical component inspection and administer a positive and negative pressure fit check.

Respirators are not to be worn when conditions prevent a good full seal. Such conditions may be a growth of beard, sideburns, bangs, a skull cap or other clothing that projects under the facepiece or temple pieces on glasses. To assure proper protection the respirator will be thoroughly inspected before each use and a positive and negative fit check will be performed each time the respirator is donned.

Respirators will be assigned to individuals for their exclusive use during the project. Air purifying respirators will be regularly cleaned and disinfected. As a minimum, respirators will be cleaned after each day's use or more often if necessary. Upon completion of the work task, the respirators will be disassembled, inspected and thoroughly cleaned and disinfected. Worn or deteriorated parts will be replaced and the respirators will be stored in a clean and sanitary location in individual plastic bags.

Selection of the respirator is the responsibility of the BVWS HSM and will be noted in the Task HASP. Selection will be based on the physical, chemical and physiological properties of the air contaminants and the concentration likely to be encountered. The quality of fit and the nature of the work being performed will also affect the choice of respirators. The capability of the respirators chosen is determined from appropriate governmental approvals, manufacturer's test and BVWS's experience with respirators.

All workers entering the Exclusion Zone or Contamination Reduction Zone at a site where use of a respirator is necessary or anticipated, must have passed at least a qualitative fit test in accordance with the guidelines established in the appendix of 29 CFR 1910.1025. Personnel must have been fit tested for the model and size of respirator issued to them. The fit test record must be current within the previous twelve months.

## **6.0 Monitoring Program**

### **6.1 Real Time Monitoring**

Direct reading instruments are used as real time air monitors. The results of the direct reading instruments are compared to the Monitoring Equipment Action Levels (Attachment 6) that describes the protective action that is to be taken to control exposure. The action levels describe the location of the real time monitoring activity and the action to be taken if predefined values are met or exceeded. Site specific operations or tasks may have other action levels established. Any change to the action level task will be noted in the appropriate Task HASP.

The frequency and location of all real time monitoring activity is based upon the nature of the site activity. Periodic real time monitoring will be performed, at a minimum, whenever the following activities occur.

- Beginning of site activity.
- Operations change.
- Work begins on a different portion of the site.
- Beginning of invasive site activity.
- Contaminants other than those previously identified are being handled.
- Personnel begin to handle obviously contaminated materials.
- Personnel are handling leaking drums or containers.
- Personnel are performing tasks that are likely to expose them to peak levels of contaminants.
- Instrumental or sensible detection of the presence of a chemical contaminant.
- Change in the weather.

### **6.2 Air Monitoring Result Logging**

Before any field activities commence, the background levels of the site must be read and recorded. Daily background readings must be conducted away from areas of potential contamination to obtain accurate results.

All monitoring results must be recorded in the field log. The monitoring results should indicate the following information.

- Range of readings.
- Mode of readings.

- Time.
- Location of reading.
- Activity during reading.
- Weather conditions.
- Wind direction.
- Action taken.

### **6.3 Personnel Monitoring**

Personnel monitoring will be performed whenever required by an OSHA chemical-specific standard found in 29 CFR 1910.1001-1048 or when deemed necessary to protect the health of the field team members. All personnel monitoring will be performed in accordance with accepted sampling and analytical procedures as defined by the HSM. Specifics of the monitoring will be described in the Task HASP.

Personnel who are likely to have exposures above OSHA-Permissible Exposure Levels (PELs) or published exposure levels for hazardous substances shall participate in a personal air sampling program. Air monitoring shall be used to identify and quantify airborne levels of hazardous substances in order to determine the appropriate level of employee protection needed onsite. Specifics of the monitoring will be described in the Task HASP.

### **6.4 Operation, Maintenance and Calibration**

The SSC is responsible for the proper operation, maintenance and calibration of each instrument to be used. The operation, maintenance and calibration instructions in the equipment manuals will be followed. The equipment manuals will be kept in the support zone during field activities. As a minimum, at the beginning of each day the instruments will be calibrated according to the manual. At the end of each day, a check of the calibration of the instrument will be performed. This end of the day check may be less stringent than the beginning of the day calibration as long as it verifies accurate readings were taken through the day.

### **6.5 Initial Survey**

Prior to any site activities, the SSC will conduct perimeter and general site monitoring, upwind and downwind, to establish background levels.

If information from the site characterization indicates a potential for ionizing radiation or IDLH condition onsite or if insufficient information is available to demonstrate otherwise, then monitoring shall include: monitoring with direct reading ionizing radiation or IDLH conditions including oxygen, explosive and toxic atmospheres; and visual observations for actual or potential IDLH conditions onsite. Upon initial entry to an area, representative air monitoring will be conducted using direct reading instruments to identify IDLH conditions, exposures above OSHA-PELs or other allowable exposure levels, including exposure to radiation, flammable atmospheres or oxygen deficient atmospheres.

## **6.6 Periodic Survey**

Periodic monitoring shall be conducted when the possibility of an IDLH condition or flammable atmosphere has developed or when there is an indication that exposure may have risen over OSHA-PELs or published exposure levels for hazardous substances

After site activities have commenced, the selective monitoring of high-risk workers, i.e., those who are closest to the source of contaminant generation, is essential. Those employees working closest with the source have the highest likelihood of being exposed to concentrations which exceed established exposure limits or action levels.

Monitoring efforts will focus on personnel most likely to receive the highest exposures and on all personnel likely to be exposed to any substance above the action level or OSHA-PEL. High risk workers will be monitored at least every 30 minutes when the potential for exposure exists.

Monitoring will be performed whenever new work begins on a different position of the site, any time that new contaminants are encountered that differ from those initially encountered, every time a different operation is initiated, whenever employees are working in areas of obvious liquid contamination or employees are handling leaking containers.

## **6.7 Perimeter Monitoring**

The SSC is responsible for determining if site activities could negatively impact zones outside the contamination reduction zone. If action levels for airborne contaminants listed in the Action Level Table are exceeded, the SSC will perform monitoring at the perimeter of the contamination reduction zone to determine if the



contaminants are getting out of the controlled zones. If action levels are exceeded at these locations, the SSC must advise the Project Manager (PM) and the BVWS HSM. If necessary the control zones will be expanded to compensate for the presence of the contaminants.

If the release of contaminants could negatively impact the health and safety of the surrounding areas, the SSC will contact the local emergency response organization responsible for protecting public health from chemical exposures. This agency will be identified prior to the beginning of site activities as part of the emergency preplanning procedures. The SSC will then notify the site representative, PM and BVWS HSM. The PM will notify the client of the chemical release and the actions taken by the SSC. Notification will be made in accordance with Section 9.6, Spills or Leaks.

## **7.0 Site Control**

The objective of site control is to control the activities and movement of people and equipment at hazardous waste sites in order to minimize the potential for worker or public exposure to hazardous substances, the spread of hazardous substance in the environment or vandalism.

### **7.1 Site Mapping**

A map of the site is located in Attachment 1. The purpose of this map is to assist site personnel in planning and organizing response activities.

The Task HASP will contain site maps that are specific to the area where specific tasks will take place. This map will include the following information: prevailing wind direction, magnetic north, site drainage points, previous sampling locations, planned sampling locations, locations of expected contamination, planned control zones, all natural and man-made topographic features including the location of buildings, containers, impoundments, pits, ponds, tanks and any other site features.

The Task HASP specific site map will be upgraded to reflect new information gained after initial site entry or from subsequent sampling and analysis activities or changes in site conditions, including changes resulting from accidents, ongoing site operations, hazards not previously identified, new materials introduced onsite, unauthorized entry or vandalism or weather conditions.

Use of overlays or other mapping techniques may be used to reduce cluttering of information.

### **7.2 Work Zones**

Work zones will be established to:

- Reduce the accidental spread of hazardous substances by workers or equipment from the contaminated areas to the clean areas.
- Confine work activities to the appropriate areas, thereby minimizing the likelihood of accidental exposure.
- Facilitate the location and evacuation of personnel in case of an emergency.

To accomplish this, the site will be divided into as many zones as necessary to ensure minimal employee exposure to hazardous substances. As a minimum, three

zones will be identified. The Exclusion Zone, the Contamination Reduction Zone and the Support Zone. Movement of personnel and equipment between these zones should be minimized and restricted to specific Access Control Points to prevent cross-contamination from contaminated areas to clean areas.

The work site will be divided into the following three zones. These zones are established so field personnel can identify where the site hazards exist. The work zones will be established so nonessential personnel will not be affected by the hazards and the hazards do not leave the zones. Details of the work site control zones will be established by the SSC prior to stating site activities and will be established so that the support zone is upwind of the Exclusion Zone or at a distance far enough away that it is not affected by the dispersion of contaminants from the Exclusion Zone.

Following is a description of each work zone and the factors to be considered when establishing them.

#### **7.2.1 Exclusion Zone**

The Exclusion Zone is the innermost area of the three areas and is considered contaminated. Within this area, levels of protection prescribed in the site HASP will be used by all personnel. An Access Control Point (ACP) will be established at the periphery of the Exclusion Zone to control the flow of personnel and equipment between it and the Contamination Reduction Zone and to check that entrance and exit procedures are followed. The extent of the Exclusion Zone is determined by the following:

- (1) Location, nature and toxicity of the waste materials.
- (2) Meteorological conditions affecting potential dispersion of contaminants.
- (3) Concern for minimal exposure of the unprotected public and investigation personnel.
- (4) Topography.

The Exclusion Zone boundary ("hot line") will be established at a reasonably safe distance from drums, tanks, ponds, liquid run-off or other physical indicators of hazardous substances. This distance will be established by the SSC before site activities begin and will take into account such factors as physical condition of site, weather conditions, sources of potential hazard and duration of activity. Subsequent to the start of operations, the boundary may be readjusted based on observation or measurements. The boundary will be physically secure and posted, well defined by geographical boundaries or otherwise delineated.

The Exclusion Zone could be further divided into zones with different levels of protection for each zone. Based upon environmental measurements or expected onsite work practices, locations within the Exclusion Zone would be defined in accordance with the level of protection required for that area. This procedure would allow for more flexibility in operation, decontamination procedures and resource utilization.

### **7.2.2 Contamination Reduction Zone**

The area between the Exclusion and Support Zones is the Contamination Reduction Zone. The purpose of the Contamination Reduction Zone is to prevent the transfer of contaminants that may have been picked up by personnel or equipment leaving the Exclusion Zone. An area within the Contamination Reduction Zones is the Contamination Reduction Corridor (CRC). The CRC is a path that persons or vehicles must take during decontamination. The CRC controls access into and out of the Exclusion Zone and confines decontamination activities to a restricted area. The CRC must be laid with plastic sheeting or equivalent.

At the boundary between the Contamination Reduction Zone and the Exclusion Zone is the hot line and access control point. Entrance into the Exclusion Zone requires the wearing of the prescribed personal protection equipment and adherence to established site entry procedures. Equipment requirements for working in the Contamination Reduction Zone may be different than those for the Exclusion Zone. At a point close to the hot line, a decontamination station will be established for both personnel and equipment exiting the Exclusion Zone. Another decontamination station may be established closer to the contamination control line for those working only in the Contamination Reduction Zone. In addition, a vehicle decontamination station will be established as necessary.

The boundary between the Support Zone and the Contamination Reduction Zone is the Contamination Control Line. Entry into the Contamination Reduction Zone from the Support Zone will be through a common point. Personnel entering at this station must be wearing the prescribed PPE for working in the decontamination area. Exiting the Contamination Reduction Zone to the Support Zone requires the removal of any suspected contaminated personal protection equipment and compliance with decontamination procedures.

All facilities and operations located in the Contamination Reduction Zone will be positioned upwind of the actual waste location whenever possible.

### **7.2.3 Support Zone**

The Support Zone is the outermost region and is considered a non-contaminated or clean area. It will contain the field office, first aid area and other facilities necessary to support site activities. Change rooms, lunch and break areas, supplies, equipment storage and maintenance areas may be located in this area. Onsite eating, drinking and smoking will be allowed only in this area. Support facilities will be located upwind from the Exclusion and Contamination Reduction Zones in relation to the prevailing wind whenever possible.

A support center or command center will be established in the Support Zone for each activity and will include the following as a minimum:

- Fully stocked industrial first aid kit.
- 15 minute eye wash station.
- Fire extinguisher (10A60BC multipurpose dry chemical).
- Telephone or radio communications capability.
- Posted emergency telephone numbers.
- Posted site and task HASPs.
- Posted OSHA "Job Safety and Health Protection" poster.
- Posted OSHA Noise standard.
- Copy of Black & Veatch Focus on Health and Safety.
- Posted map with route to hospital.
- Instrument manuals.
- Binder of MSDS.
- BVWS "Health and Safety Manual for Hazardous Waste Site Investigations."
- USEPA Standard Operating Safety Guides.

At the discretion of the SSC, the support center may be based in an onsite vehicle.

### **7.3 Buddy System**

Except for Level D work involving non-intrusive methods, the implementation of a buddy system is mandatory for entry into the Contamination Reduction Zones or the Exclusion Zone. The prime objective of the buddy system is to ensure rapid assistance in the event of an emergency.

Each member of the field team will be designated by the SSC to observe at least one other field team member. The SSC will implement the system at the ACP for personnel entering the Exclusion Zone.

As part of the buddy system, workers will remain close together and maintain visual contact with each other to provide assistance in the event of an emergency. Should an emergency situation arise, workers will use the communication signals established and agreed upon prior to entering the contaminated area. The communication signals are located in Section 8.6.3.

The responsibilities of workers utilizing the buddy system include:

- Providing their buddy with assistance.
- Observing their buddy for signs of chemical exposure.
- Observing their buddy for signs of stress due to temperature extremes.
- Observing their buddy for signs of stress or anxiety while wearing chemical protective clothing.
- Periodically checking the integrity of their buddy's PPE.
- Notifying the SSC or other site supervisory personnel if emergency assistance is needed.

Workers should not rely entirely on the buddy system to ensure that help will be provided in the event of an emergency. To augment this system, workers in contaminated areas should, whenever possible, remain in line-of-sight or communication contact with the SSC or other personnel in the Support Zone.

## **7.4 Audits**

Inspection and audits of the work area will be conducted by the SSC as necessary to determine the effectiveness of the site HASP or Task HASP. The site HASP and Task HASP will be periodically reviewed by the SSC to keep it current with respect to site conditions. The SSC will report their findings to the site manager. Correcting deficiencies in the effectiveness and application of the site HASP is the responsibility of the site manager. Changes to the site HASP to address any deficiencies will be made to the Task HASP in accordance with the Section 12 of the Task HASP.

## 7.5 Visitors

BVWS recognizes that all visitors' employers are ultimately responsible for their compliance with all applicable OSHA regulations while on a hazardous waste site. BVWS personnel will be courteous to all visitors and adhere to the following procedures for the safety sake of the visitors.

- Visitors are expected to have the permission of the site owner to be on the site.
- The SSC will advise all visitors of the nature, level and degree of exposure likely as a result of BVWS related activities and the emergency response procedures that pertains to the visitors for the site.
- The SSC will advise all subcontractors coming onto the site of the hazardous chemicals present, effect of exposure, location of the MSDSs, location of the emergency equipment and the emergency plan and evacuation procedures.
- Visitors entering the Contamination Reduction Zone and Exclusion Zone at the Site will be offered an opportunity to read the applicable provisions of this site HASP.
- Visitors will be expected to comply with OSHA requirements such as medical monitoring, training and respiratory protection.
- Visitors will be expected to provide their own PPE.
- In the event that a visitor does not adhere to the provisions of the site HASP, the SSC will request the visitor to leave the work area.
- If the visitor interferes with the work activity or poses a safety hazard to anyone onsite, the SSC will terminate work activities and the BVWS PM and HSM will be contacted immediately.
- All nonconformance incidents will be recorded in the site log by the SSC.
- The client and governmental authorities may choose to adopt this plan or develop their own to protect their onsite employees, although BVWS will not take responsibility for compliance of onsite personnel employed by these parties.

## 8.0 Safety and Emergency Procedures

### 8.1 Standing Safety Orders

The following standing orders are established to ensure safe work practices. Task specific standing orders are addressed in the Task HASP.

- Report any sign of radioactivity, explosivity or unusual conditions to the supervisor immediately.
- Check in and out at the entrance ACP of the Exclusion Zone.
- Maintain close contact with your buddy in the Exclusion Zone.
- Eating, drinking, chewing gum or tobacco, smoking or any practices that increases the probability of hand-to-mouth transfers and ingestion of material is prohibited in any controlled area such as Contaminant Reduction Zone and Exclusion Zone.
- Whenever decontamination procedures for outer garments are in effect, good personal hygiene will be practiced as soon as possible after the protective garment is removed (i.e., washing hands). A shower is recommended immediately after any work period.
- No facial hair that interferes with the effectiveness of a respirator will be permitted on personnel required or potentially required to wear respiratory protection equipment.
- Contact with potentially contaminated surfaces will be avoided whenever possible. Personnel should not walk through puddles, mud or other discolored surfaces or kneel on the ground. Personnel should not lean, sit or place equipment on drums, containers, vehicles or exposed surfaces without plastic covering.
- Medicine and alcohol can magnify the effect from exposure to certain compounds. It will be the responsibility of each BVWS employee and each subcontractor to notify, on a daily basis, the SSC of any individual who is using prescribed medication. Site personnel will not be allowed onsite while under the influence of alcohol or drugs that cannot be obtained over the counter without a physician's authorization.
- Personnel and equipment in the work areas will be minimized, but consistent with effective site operations.



- All unsafe or inoperable sampling or monitoring equipment left unattended will be identified by the SSC by a "DANGER-DO NOT OPERATE" tag.
- Work will be restricted to daylight hours only.

## **8.2 Medical Emergencies**

At least two BVWS team members conducting hazardous waste operations at the site will have successfully completed a Red Cross sponsored course in adult first aid and cardiopulmonary resuscitation (CPR). Prior to the start of work, the SSC will make arrangements for medical facilities, ambulance service and medical personnel to be available for prompt attention to the injured.

Onsite activities will require a first-aid station which will be located within the Support Zone. First-aid kits will be, as a minimum, 16-unit first-aid kits and will be provided in the ratio of one for each 10 persons.

Portable 15-minute emergency eye-wash stations will be provided within the Support Zone. Identification markers will be provided to readily denote locations of the eyewash stations.

Emergency telephone numbers and reporting instructions for ambulance, local physician, hospital, poison control center, fire and police will be conspicuously posted in the Support Zone.

The SSC will act as the emergency coordinator for all medical emergencies. If a person is injured or becomes ill, personnel identified as trained in first aid and CPR will be notified immediately. First aid and CPR will be administered immediately. In all cases, treatment for shock should be considered. After attending to the victim, the SSC will be notified. Depending on the severity of the injury or illness, the SSC may notify medical emergency response organizations. If the victim is transferred off-site, the SSC will assign a field team member to accompany the victim.

### **8.2.1 Chemical Exposure Emergency**

If personnel experience any adverse effects or symptoms during field activity, the individuals will notify the SSC. The SSC will assess the situation and make a determination on the extent of medical attention needed. If it is determined that the problem was due to chemical exposure, first aid for chemical exposure will be administered as soon as possible. If necessary to transport the individual to the

hospital the individual(s) exposed to those chemicals will be transported by an unexposed individual. The Site HASP and available MSDSs will accompany the group to the hospital. The incident must be reported to the HSM immediately. A written report of the incident will be distributed to the PM and the HSM within 48 hours.

The following first aid for chemical exposures will be administered as soon as possible;

- Eye Exposure--If contaminated solid or liquid gets into the eyes, they will be washed immediately at the 15 minute emergency eyewash station using large amounts of water and lifting their lower and upper lids occasionally. Medical attention will be obtained immediately. (Use of contact lenses is not permitted in the designated Exclusion Zones).
- Skin Exposure--If contaminated solid or liquid gets on the skin, the affected individual will promptly flush the skin for at least 15 minutes, then wash with soap or mild detergent and water. If contaminated solids or liquids penetrate through the clothing, clothing will be immediately removed and treatment for skin exposure administered. Medical attention will be obtained if symptoms warrant.
- Inhalation--If a person breathes in a large volume of potentially toxic contaminants, the affected person will be moved to fresh air at once. If breathing has stopped, CPR will be performed. The affected person will be kept warm and at rest. Medical attention will be obtained immediately.
- Ingestion--If contaminated solid or liquid is swallowed, medical attention will be obtained immediately.

### **8.2.2 Accident Reporting**

Injuries or illnesses that require attention beyond simple first aid or requiring attention by a physician or involving exposure to blood or other potentially infectious materials must be reported to the Worker's Compensation Administrator and BVWS HSM as soon as possible but no later than 24 hours after the accident. In the event of a fatality or more than one hospitalization, the notification to the HSM must be immediate. The HSM must notify the local OSHA area office within 8 hours. The SSC must complete the appropriate accident report forms and the required State Workers Compensation form. The SSC is responsible for contacting the State

Worker's Compensation Office to obtain the necessary report form. The SSC is responsible for completing the forms and submitting the originals to the BVWS HSM. Copies should be sent to the Workers Compensation Administrator and PM. Copies must be filed in the project file.

Accidents that must be reported include:

- Injury or illnesses that require attention beyond simple first aid.
- Injury or illnesses that require attention by medical professionals.
- Injury or illnesses that result in time away from work.
- Injury or illnesses that restricts the ability of the injured to work.
- Unconsciousness, explained or unexplained.
- Exposures of personnel to blood or other potentially infectious agents.
- Exposures to chemical or physical agents that result in adverse signs or symptoms.

All incidents that are near miss injury or illness accidents or physical accidents must be summarized on the hazardous waste site investigation activity report form and submitted to the PM and BVWS HSM as soon as possible.

The SSC is responsible for investigating the cause of all accidents and report on the findings and corrective actions taken in the manner described above. The SSC may request the assistance of the BVWS HSM or other personnel to investigate the accident. The final report on the accident is the responsibility of the SSC.

Accident investigation and recordkeeping must comply with the BVWS accident investigation and recordkeeping standard operating procedure.

### **8.2.3 Hospital Route**

The route to the hospital is shown and described in Attachment 1. The route to the hospital will be conspicuously posted in the Support Zone. The SSC and key field personnel will drive the route to the hospital emergency room door prior to the start of site activities in order to become familiar with the route. The route will be driven at least weekly to confirm an unobstructed route.

## 8.3 Temperature Extremes

### 8.3.1 Heat Stress Monitoring

Heat stress poses a serious health danger to site workers and may create secondary safety hazards by impairing a worker's coordination and judgment. Heat stress can occur at almost any temperature and is more likely when PPE is in use.

The use of protective equipment may create heat stress. Monitoring of personnel will commence when the ambient temperature is 70°F or above. Table 8-1 presents the suggested frequency for such monitoring. Monitoring frequency is dependent on the type of protection worn (permeable or impermeable clothing), the dry bulb temperature and the amount of sunshine. Monitoring frequency should increase as the ambient temperature increases or as slow recovery rates are observed. Heat stress monitoring should be performed by a person with a current first aid certification who is trained to recognize heat stress symptoms. For monitoring the body's response to excess heat, one or more of the following techniques will be used.

- **Heart rate.** Count the radial pulse before site activities and during a 30-second period as early as possible in the monitoring cycle.
  - If the heart rate exceeds 110 beats per minute at the beginning of the rest period, shorten the next cycle by one-third and keep the rest period the same.
  - If the heart rate still exceeds 110 beats per minute at the next rest period, shorten the following cycle by one-third.
- **Oral temperature.** Use a clinical thermometer (three minutes under the tongue) or similar device to measure the oral temperature before site activities and at the end of the monitoring cycle (before the worker drinks liquid).
  - If oral temperature exceeds 99.6°F (37.6°C), shorten the next work cycle by one-third without changing the rest period.
  - If oral temperature still exceeds 99.6°F (37.6°C) at the beginning of the next rest period, shorten the following cycle by one-third.
  - Do not permit a worker to wear a semipermeable or impermeable garment when oral temperature exceeds 100.6°F (38.1°C).

Table 8-1  
Suggested Frequency of Physiological Monitoring  
for Fit and Acclimatized Workers<sup>a</sup>

Adjusted Temperature <sup>b</sup>	Normal Work Ensemble <sup>c</sup>	Impermeable Ensemble <sup>d</sup>
90°F (32.2°C) or above	After each 45 minutes of work	After each 15 minutes of work
87.5 to 90°F (30.8 to 32.2°C)	After each 60 minutes of work	After each 30 minutes of work
82.5 to 87.5°F (28.1 to 30.8°C)	After each 90 minutes of work	After each 60 minutes of work
77.5 to 82.5°F (25.3 to 28.1°C)	After each 120 minutes of work	After each 90 minutes of work
72.5 to 77.5°F (22.5 to 25.3°C)	After each 150 minutes of work	After each 120 minutes of work
<sup>a</sup> For work levels of 250 kilocalories/hour. <sup>b</sup> Calculate the adjusted air temperature (ta adj) by using the equation: $ta\ adj\ ^\circ F = ta\ ^\circ F + (13 \times (\% \div 100) \text{ sunshine}).$ Measure air temperature (ta) with a standard alcohol-in-glass thermometer or equivalent, with the bulb shield from radiant heat. Estimate percent sunshine by judging what percent of the time the sun is not covered by clouds that are thick enough to produce a shadow (100% sunshine = no cloud cover and a sharp distinct shadow; 0% sunshine = no shadows). <sup>c</sup> A normal work ensemble consists of cotton coveralls. <sup>d</sup> An impermeable ensemble consists of tyvek coveralls.		

Heat stroke is a life-threatening heat disorder that requires life-saving first aid. Decontamination should be omitted prior to obtaining immediate medical attention.

**Heat stress** can become life threatening. Unless the victim is grossly contaminated, decontamination should be omitted or minimized and treatment begun immediately.

- Prevention of Heat Stress. Proper training and prevention measures will aid in averting serious illness and loss of productivity. Heat stress prevention is particularly important because once a person suffers from heat stroke or heat exhaustion that person may be predisposed to additional heat-related illnesses. To avoid heat stress, the SSC has the authority to take the following steps.
- Adjust work schedules
  - Modify work/rest schedules according to monitoring requirements.
  - Mandate work slowdowns as needed.
  - Perform work during cooler hours of the day if possible or at night if adequate lighting can be provided.
- Provide shelter (air-conditioned, if possible) or shaded areas to protect personnel during rest periods.
- Maintain worker's body fluids at normal levels. This is necessary to ensure that the cardiovascular system functions adequately. Daily fluid intake must approximately equal the amount of water lost in sweat, e.g., eight fluid ounces (0.23 liters) of water must be ingested for approximately every eight ounces (0.23 kg) of weight loss. The normal thirst mechanism is not sensitive enough to ensure that enough water will be drunk to replace lost sweat. When heavy sweating occurs, the workers will be encouraged to drink more. The following strategies may be useful:
- Provide drinking water as needed
  - Maintain water temperature at 50 to 60°F (10 to 16.6°C).
  - Provide dedicated personal bottles or containers that hold about 1 quart of water.
  - Dedicated personal bottles of water should be allowed in the Contamination Reduction Zone.
  - Have workers drink 16 ounces (0.5 liters) of fluid (preferably water or diluted drinks) before beginning work.

- Urge workers to drink a cup or two every 15 to 20 minutes or at each break. A total of 1 to 1.6 gallons (4 to 6 liters) of fluid per person per day are recommended, but more may be necessary to maintain body weight.
- An additional water source should be maintained outside of Contamination Reduction Zone.
- Train workers to recognize the symptoms of heat-related illnesses. Table 8-2 presents a summary of typical symptoms and treatment of heat stress.
- Source of water should be available to spray down a person as a measure of preventing or treating heat stress.

### **8.3.2 Cold Stress Monitoring**

When ambient temperature reaches 45°F or below steps should be taken to prevent cold stress.

Excessive exposure to low environmental air temperatures or immersion in low temperature water are usually fatal unless quickly remedied. Workers must be protected from exposure to cold so that the deep core temperature of the body does not fall below 96.8°F.

Pain in the extremities may be the first early warning of danger to cold stress. Severe shivering may occur if the body temperature drops to 95°F. Workers exhibiting signs of cold stress or hypothermia must get to a warm area until they are safely able to resume their duties.

- At air temperatures of 2°C (35.6°F) or less, it is imperative that workers who become immersed in water or whose clothing becomes wet be immediately provided a change of clothing and be treated for hypothermia.
- Provisions for additional total body protection are required if work is performed in an environment at or below 4°C (40°F). The workers shall wear cold protective clothing appropriate for the level of cold and physical activity.
- If only light work is involved and if the clothing on the worker may become wet on the job site, the outer layer of the clothing in use may be of a type impermeable to water. With more severe work under such conditions, the outer layer should be water repellent and their outerwear should be changed as it becomes wetted. The outer garments must

Table 8-2  
Heat Stress Symptoms and Treatment

Type	Symptoms	Treatment
Heat Related Illness	Localized redness of skin and reduced sweating; reduced tolerance to heat.	Keep skin clean and dry.
Heat Cramps	Muscle spasm and pain in extremities and abdomen.	Remove person to cool area. Give small amounts of salted water.
Heat Exhaustion	Weak pulse; shallow breathing; pale, cool, moist skin; profuse sweating; dizziness; fatigue.	Remove person to cool area, reduce body temperature. Cool by convection. Give small amounts of salted water. Do not allow person to become chilled.
Heat Stroke	Red, hot, dry skin; body temperature of 105°F or greater; nausea; dizziness; confusion; strong rapid pulse; coma. Convulsions may occur.	Seek medical attention immediately. Get victim cool quickly, wrap in wet cloth, spray with cool water or immerse in cool water. Fan vigorously during transport to hospital. Apply cold packs, if available, avoiding direct contact between skin and pack/ice.



include provisions for easy ventilation in order to prevent wetting of inner layers by sweat. If work is done at normal temperatures or in a hot environment before entering the cold area, the employees shall make sure that their clothing is not wet as a consequence of sweating. If their clothing is wet, the employee shall change into dry clothes before entering the cold area.

- The workers shall change socks and any removable felt insoles at regular daily intervals or use vapor barrier boots. The optimal frequency of changes shall be determined empirically and will vary individually and according to the type of shoe worn and how much the individual's feet sweat.
- If extremities, ears, toes and nose, cannot be protected sufficiently to prevent sensation of excessive cold or frostbite by hardware, footwear and face masks, these protective items shall be supplied in auxiliary heated versions.
- If the available clothing does not give adequate protection to prevent hypothermia or frostbite, work shall be modified or suspended until adequate clothing is made available or until weather conditions improve.
- The recommended limits for properly clothed workers for periods of work at temperatures below freezing are listed in Table 8-3.

## **8.4 Decontamination Procedures**

### **8.4.1 General**

All personnel and equipment will be properly decontaminated prior to leaving a site. Decontamination methods could involve (1) physically removing contaminants, (2) neutralizing contaminants by chemical detoxification or disinfection or (3) removing contaminants through a combination of both physical and chemical means. The types, locations, physical states and concentrations of contaminations present will determine the degree of decontamination necessary.

As part of the system to prevent these physical transfers of contaminants by people or equipment from onsite to off-site areas, site specific procedures will be instituted for decontaminating all items leaving the Exclusion Zone and the Contamination Reduction Zone. These procedures will include the decontamination

**Table 8-3**  
**Cold Work Environment Work Practice**

Cooling Power of Wind on Exposed Flesh Expressed as an Equivalent Temperature (under calm conditions)*												
Estimated Wind Speed (in mph)	Actual Temperature Reading (*F)											
	50	40	30	20	-10	0	-10	-20	-30	-40	-50	-60
	Equivalent Chill Temperature (*F)											
calm	50	40	30	20	10	0	-10	-20	-30	-40	-50	-60
5	48	37	27	16	6	-5	-15	-26	-36	-47	-57	-68
10	40	28	16	4	-9	-24	-33	-46	-58	-70	-83	-95
15	36	22	9	-5	-18	-32	-45	-58	-72	-85	-99	-112
20	32	18	4	-10	-25	-39	-53	-67	-82	-96	-110	-121
25	30	16	0	-15	-29	-44	-59	-74	-88	-104	-118	-133
30	28	13	-2	-18	-33	-48	-63	-79	-94	-109	-125	-140
35	27	11	-4	-20	-35	-51	-67	-82	-98	-113	-129	-145
40	26	10	-6	-21	-37	-53	-69	-85	-100	-116	-132	-148
(Wind speeds greater than 40 mph have little additional effect.)	LITTLE DANGER				INCREASING DANGER				GREAT DANGER			
	In < 1 hr with dry skin.				Danger from freezing of exposed				Flesh may freeze within 30			
	Maximum danger of false sense of security				flesh within one minute.				seconds.			
	Trenchfoot and immersion foot may occur at any point on this chart.											

\*Developed by U.S. Army Research Institute of Environmental Medicine, Natick, MA.

Work/Warm-up Schedule for Four-Hour Shift*											
Air Temperature-Sunny Sky		No Noticeable Wind		5 mph Wind		10 mph Wind		15 mph Wind		20 mph Wind	
°C (approx.)	°F	Max. Work Period	No. of Breaks	Max. Work Period	No. of Breaks	Max. Work Period	No. of Breaks	Max. Work Period	No. of Breaks	Max. Work Period	No. of Breaks
1. -26° to -28°	-15° to -19°	(Norm. Breaks)	1	(Norm. Breaks)	1	75 min.	2	55 min.	3	40 min.	4
2. -29° to -31°	-20° to -24°	(Norm. Breaks)	1	75 min.	2	55 min.	3	40 min.	4	30 min.	5
3. -32° to -34°	-25° to -29°	75 min.	2	55 min.	3	40 min.	4	30 min.	5	Non-emergency work should cease	
4. -35° to -37°	-30° to -34°	55 min.	3	40 min.	4	30 min.	5	Non-emergency work should cease			
5. -38° to -39°	-35° to -39°	40 min.	4	30 min.	5	Non-emergency work should cease					
6. -40° to -42°	-40° to -44°	30 min.	5	Non-emergency work should cease							
7. -43° & below	-45° & below	Non-emergency work should cease									

**Notes**

- Schedule applies to moderate to heavy work activity with warm-up breaks of ten (10) minutes in a warm location. For Light-to-Moderate Work (limited physical movement): apply the schedule one step lower. For example, at -30°F with no noticeable wind (Step 4), a worker at a job with little physical movement should have a maximum work period of 40 minutes with 4 breaks in a 4-hour period (Step 5).
- The following is suggested as a guide for estimating wind velocity. If accurate information is not available: 5 mph: light flag moves; 10 mph: light flag fully extended; 15 mph: raises newspaper sheet; 20 mph: blowing and drifting snow.
- If only the WindChill Factor is available, a rough rule of thumb for applying it rather than the temperature and wind velocity factors given above would be: 1) special warm-up breaks should be initiated at a wind chill of about 1750 W/m<sup>2</sup>/hr, 2) all non-emergency work should have ceased at or before a wind chill of 2250 W/m<sup>2</sup>/hr. In general the warm-up schedule provided above slightly under-compensates for the wind at the warmer temperatures, assuming acclimatization and clothing appropriate for winter work. On the other hand, the chart slightly over-compensates for the absolute temperatures in the colder ranges, since windy conditions rarely prevail at extremely low temperatures.

\*From Occupational Health & Safety Division, Saskatchewan Dept. of Labor.

of PPE, vehicles and all field equipment and use of correct methods of removing PPE to avoid transfer of contaminants from the clothing to the body and decontamination or disposal. In addition to the decontamination procedures, specific entry and exit routes through the Contamination Reduction Zone will be established for personnel, equipment and vehicles to minimize the possibilities of additional spread of contaminants. These site specific decontamination procedures are described in the Task HASP.

Equipment that is not decontaminated or not completely decontaminated will be disposed onsite or transferred in a controlled manner for subsequent decontamination in a controlled situation. Such equipment will be bagged or wrapped in plastic for transferring to the decontamination location. The outside container of the equipment must be labelled as contaminated and the potential contaminants and associated hazards must be listed. In order to minimize the need to decontaminate equipment, this type of equipment may be packaged or wrapped in a material that will protect it from contamination but does not interfere with its proper operation.

The initial decontamination plan is based upon a nominal case situation. This initial decontamination plan will be modified, adding necessary stations or otherwise adapting it to site conditions when a worst-case situation occurs. Changes in the decontamination plan will be made and noted in the Task HASP by the SSC. If, on visual examination, chemical protective clothing appears grossly contaminated, a thorough decontamination is required.

The SSC is responsible for selecting and monitoring the decontamination procedures to verify their effectiveness of decontamination. When the decontamination procedures are found to be ineffective, appropriate steps will be taken to correct the deficiencies.

Methods that have proven to be effective in removal of contaminants are included in Attachment 7.

#### **8.4.2 Emergency Decontamination**

In a medical emergency, the primary concern is to prevent the loss of life or severe injury to site personnel. Any person who becomes ill or injured in the Exclusion Zone must be decontaminated to the maximum extent possible before providing the necessary first aid or before permitting the person to enter the Support Zone.

If the patient's condition is serious, at least partial decontamination should be completed. This may be accomplished by:

- Complete derobing of the patient and redressing in clean coveralls.
- Wrapping patient in a blanket or plastic.
- Spot decontamination.

If the injury or illness is minor, full decontamination will be completed and first aid administered prior to transport. The SSC will select the degree of needed decontamination in proportion to the potential hazards posed by the contaminants. When a person who is not fully decontaminated that requires transportation to the hospital, the SSC will have the surfaces covered with plastic to prevent the spreading of contamination.

First aid should be administered while awaiting an ambulance or paramedics.

#### **8.4.3 PPE**

Personnel leaving the Exclusion Zone must remove potential contaminants in an orderly and controlled manner in order to avoid contamination of the person. Primary means of avoiding contamination of the person is to minimize contact with contaminants during site activities. Secondary means is to assume contamination and systematically reduce the contamination prior to doffing.

Personal decontamination involves the sequential doffing of PPE, starting with the most heavily contaminated and working to the least contaminated. This progression, in combination with separating each step of the decontamination procedure by a minimum of three feet, ensures contamination decreases as the person moves from one station to another further along the line. Wash and rinse steps may be needed in order to reduce the level of contamination to a level safe to handle. Since it is virtually impossible to prevent the transfer of contaminants on protective clothing to the wearer, thorough decontamination of the chemical protective clothing is necessary. When done effectively the amount of substance remaining on the chemical protective clothing is greatly reduced and the possibility of transfer is proportionately reduced. Therefore, heavily contaminated disposable chemical protective clothing should be washed and rinsed to minimize the spread of the contaminants during doffing. Unsoiled disposable chemical protective clothing may not require the wash and rinse steps.

Polyethylene plastic sheeting will be placed on the ground in the personal decontamination corridor and the decontamination stations arranged on the top of

the plastic. The first station will be located within the Exclusion Zone and will be the station where gross contamination is removed.

As a minimum, the level of protection required for the personnel assisting with personnel decontamination will be the most protective of either Level D or one level less than the level worn in the Exclusion Zone.

The SSC is responsible for monitoring the effectiveness of the decontamination procedures.

#### **8.4.4 Instruments**

Instrument decontamination requires that, as a minimum, all external surfaces and surfaces that came in contact with the contaminants be wiped with a cloth dampened with a trisodium phosphate detergent and wiped dry. Contamination should be prevented by packaging or wrapping the instrument in a material that will protect it from contamination but does not interfere with its proper operation.

Instruments that are internally contaminated or not completely decontaminated will be transferred in a controlled manner for subsequent decontamination. Such instruments will be bagged or wrapped in plastic for transfer to the decontamination location. The outside container of the instrument must be labelled as contaminated and potential contaminants and associated hazards must be listed.

#### **8.4.5 Equipment**

Equipment that came in direct contact with the contaminant must be decontaminated and shown to be clean before returning it to the owner or equipment center.

#### **8.4.6 Decontamination Solutions**

The standard decontamination solutions will be a solution of Alconox or equivalent detergent. Generally a solution of trisodium phosphate detergent is sufficient for most site applications. The decontamination solution should be prepared in accordance with the manufacturer's instructions. In general, potable water is a sufficient rinse, although for specific equipment, decontamination may require the use of deionized or distilled water.

Other decontamination solutions are listed in Attachment 7.

#### **8.4.7 Vehicle Decontamination Station**

At sites where drill rigs or other vehicles are used for onsite activities, it may be necessary to construct a vehicle decontamination station (VDS) to prevent the spread of contaminants to off-site locations. Typically, the VDS is a sloping area lined with plastic sheeting and gravel so that decontamination solutions can flow into a lined collection pit, sump or trench. The pit contents can then be pumped into Department of Transportation (DOT) approved 55 gallon drums or containers for later disposal. Other VDS configurations include plastic sheeting with wood runways to accommodate vehicles.

It is imperative that all vehicles used onsite be thoroughly decontaminated before being allowed to leave the site. Special attention should be paid to the treads or tracks and interior surfaces. Decontamination can be expedited if vehicle interiors are lined with plastic sheeting prior to commencing onsite activities.

When using a central vehicular decontamination station, gross dirt must be removed from the vehicle before leaving the Contamination Reduction Zone.

### **8.5 Disposition of Decontamination Wastes**

All materials and equipment used for decontamination must be disposed of properly. Clothing, tools, buckets, brushes and other equipment that are contaminated must be secured in containers and labelled. Clothing not completely decontaminated onsite should be double bagged before being removed from the site. Spent decontamination soap/rinse solutions must be transferred to drums which are labelled and disposed of with other substances onsite.

Commercial laundries or cleaning establishments that clean protective clothing or equipment shall be informed of the potentially harmful effects of exposures to the contaminants.

#### **8.5.1 Disposal Procedures**

All wash and rinse water will be transferred to a container that will be covered and labeled as to contents and stored onsite. If 55 gallon drums are used, they will be DOT approved drums and lids will be put on all drums in the event of rain and at the close of each work day. Drums will be supported on wood blocks or pallets to reduce corrosion. Means and method of disposal of decontamination solutions will be decided on a case-by-case basis and will be detailed in the Task HASP.

### **8.5.2 Contamination Reduction Corridor Breakdown**

When the Contamination Reduction Corridor is no longer needed, it must be closed down. All disposable clothing and plastic sheeting used during the operation must be double bagged and contained onsite in a labelled DOT approved drum or container. All wash tubs, pails, containers, etc. must be thoroughly washed, rinsed and dried prior to removal from the site.

## **8.6 Communications**

Communication systems will be established at the site for both internal and external communication for both routine and emergency operations.

### **8.6.1 Internal Communication**

Internal communication refers to communication between workers operating in the Exclusion Zone or Contamination Reduction Zone or to communication from the Support Zone to these workers. Internal communication will be used to:

- Alert team members to emergency situations.
- Convey safety information (e.g., air time remaining in SCBA, heat stress check, hazards detected).
- Communicate changes in the work to be accomplished.
- Maintain site control.

The internal communication system may include such standard communication devices as radio, audible signals from noise makers or visual signals from hand or body movements.

Identification of individual workers is necessary to ensure commands are addressed to the right worker. This may be accomplished by one of several methods, depending on the specifics of the site activities.

- Marking the suit with the worker's name.
- Color coding, numbering or symbols for long-distance identification.
- Use of names for short distance, small work force tasks.

Standard audible and visual communication signals are listed in Section 8.6.3.

### **8.6.2 External Communications**

External communications refers to communication between onsite and off-site personnel. An external communication system must be maintained in order to:

- Coordinate emergency response efforts with off-site responders.

- Report progress or problems to management.
- Maintain contact with essential off-site personnel.

The primary means of external communication are telephone and radio. Where telephones are not available immediately at the site, all team members will be notified of the location and dialing instructions of the nearest telephone. The correct change and necessary telephone numbers will be made readily available in the Support Zone. If radios are used, their locations will be clearly marked. Clear instructions for their use will be posted with the radios at all times.

If access to external communications takes longer than five minutes to reach, the field team will be equipped to have immediate access to emergency response organizations.

Specifics of the internal and external communication methods will be detailed in the Task HASP.

### **8.6.3 Communication Signals**

Purpose: To alert members of emergencies, convey safety information, communicate changes in the work to be accomplished and to maintain site control.

- Audible Internal Communications (whistle, vehicle horn, personal air horn)

#### Signal

- 1) one long blast
- 2) two short blasts
- 3) two long blasts
- 4) three short blasts

#### Definition

- evacuate area
- localized problem, be on the alert
- all clear, reentry permitted
- cease work operations

- Visual Internal Communications (hand signals)

#### Signal

- 1) Hands clutching throat
- 2) Hands on top of head
- 3) Thumbs up
- 4) Thumbs down
- 5) Arms waiving upright
- 6) Grip partners wrist
- 7) Cross arms above head

#### Definition

- Out of air/cannot breath
- Need assistance
- OK/I am alright/I understand
- No/negative
- Send backup support
- Exit area immediately
- Cease work operations



#### **8.6.4 Hazard Communication**

The following apply to all chemicals where the chemical concentration exceeds 1% or 0.1% for a carcinogen. This section is applicable to all chemicals brought onsite, used onsite or present as a contaminant onsite.

All chemicals will be accompanied by a Material Safety Data Sheet (MSDS). All MSDS's will be included in Attachment 3 of the Site HASP and made available to all personnel.

All containers of chemicals will be properly labelled with the chemical name and appropriate hazard warning statement.

All team members will be trained in the following at the initial safety briefing or wherever the presence of the chemicals is identified.

- Methods and observations that may be used to detect the presence or release of a hazardous chemical in the work area.
- The physical and health hazards of the chemical in the work area.
- The measures employees can take to protect themselves from these hazards.
- Location of the MSDS's.
- Explanation of the labelling system.

#### **8.7 Confined Space Entry Procedures**

BVWS team members are not authorized to enter confined spaces without written authorization from the BVWS HSM. Confined spaces are defined as spaces that meet the following criteria.

- Large enough for a person to bodily enter.
- Limited or restricted means of entry or exit.
- Not designed for continuous employee occupancy.

Entry into a confined space must comply with the BVWS standard operating procedure for entry into confined spaces.

## **9.0 Emergency Action Plan**

In the event of an emergency, the SSC will act as the Emergency Coordinator. The SSC will assess the emergency and determine if onsite resources are capable of responding to the emergency without exceeding the level of training and resources available. Otherwise, emergency response by BVWS field team members will be to immediately evacuate the site in the event of a non-medical emergency. No member of the field team is permitted to assist in responding to a major non-medical emergency.

### **9.1 Preplanning**

Arrangements will be made with the local response community (i.e. fire department or local response services) for them to respond to emergencies that may occur during site operations. The local response community will be provided information regarding site activities, including the types of operations being conducted at the site, the type and degree of contamination at the site, the location of the work zone and any other relevant information that may be necessary for an appropriate response. Such information will be provided to a supervisory level representative of the emergency response organization prior to the commencement of site operations.

### **9.2 Reporting Emergencies**

Emergencies of all types must be reported to the SSC immediately through established communication means. If the SSC is not available, report the emergency to the nearest BVWS supervisory representative.

The SSC will assess the emergency and determine if onsite resources are capable of responding to the emergency without exceeding the level of training and resources available. If off-site emergency response organizations are needed, the appropriate notifications will be made in accordance with the preplanning arrangements made.

### **9.3 Notification**

In the event of an emergency, personnel will take direction from the SSC. The SSC will notify the appropriate emergency response organization necessary to mitigate the emergency. As soon as possible, the SSC will make contact with the

BVWS PM and the BVWS HSM. If an emergency response organization is notified to respond, the SSC will dispatch a representative to the site entrance to escort the emergency response organization to the emergency scene. The SSC will act as the liaison with the officer-in-charge of the emergency response organization.

## **9.4 Emergency Contacts**

Attachment 1 lists emergency telephone numbers and reporting instructions for ambulance, physician, hospital, poison control center, fire, police, local hazmat team, emergency rescue team, client contact and site contact. Attachment 1 will be conspicuously posted in the Support Zone. Where phone numbers are not available for the above mentioned organization, the list will so indicate.

The present status and capabilities of emergency response teams that would provide assistance at the time of an emergency is described in the Task HASP.

## **9.5 Fire or Explosion**

In the event of a fire or explosion, the local fire department should be notified immediately. The SSC or designated alternate will advise the fire commander of the location, nature and identification of the hazardous materials onsite. The SSC will maintain contact with the emergency response organization officer-in-charge.

If it is safe to do so, site personnel may:

- Use fire fighting equipment available onsite to control or extinguish incipient fires.
- Remove or isolate flammable or other hazardous materials they may contribute to the fire.
- Inform the site supervisor immediately.
- Inform the site contact immediately.

## **9.6 Spills or Leaks**

In the event of a spill or a leak, site personnel will:

- Inform the site supervisor immediately.
- Inform the site contact immediately.
- Locate the source of the spillage and stop the flow if it can be done safely.
- Contain the spill.

- Notify the local emergency response organization if the spill cannot be controlled.
- Notify the local fire department if the chemical release has the potential of impacting the public health or environment off-site.
- Request off-site assistance in recovery of spilled material.

If the SSC determines that a situation exists that could threaten human health or the environment outside the site area, the local fire department will be notified immediately. In accordance with USEPA SARA Title III, the SSC will also immediately notify the National Response Center and the BVWS PM. The telephone report will include:

- (1) Name and telephone number of reporter.
- (2) Name and address of facility.
- (3) Time and type of incident (e.g., release, fire).
- (4) Name and quantity of materials(s) involved, to the extent known and the location of the discharge within the facility.
- (5) The extent of injuries, if any.
- (6) The possible hazards to human health, or the environment, outside of the site area.
- (7) Actions the person reporting the discharge proposes to take to contain, clean up and remove the substance.

## 9.7 Evacuation Procedures

At each work site, an evacuation route and rally point will be identified. The evacuation route will be selected to direct field personnel away from the Exclusion Zone to the nearest exit. During evacuation, every effort will be made to evacuate with their assigned buddy. The evacuation route will avoid high hazard areas and efficiently move personnel away from the emergency site.

The evacuation route will be towards a rally point. The rally point is a common area where all field team members are to meet following an evacuation. The purpose of the rally point is to remove personnel to a location a safe distance away from the emergency and away from high hazard areas and to give the SSC a location where all field personnel can be accounted. In the event of missing personnel, emergency response organizations will be notified immediately. The SSC will offer whatever assistance is requested by the emergency response organizations in the event search and rescue is necessary. In the event that the rally point is proximate

to the hazard, the SSC will authorize the evacuees to move to a safer rally point. All personnel will remain at the rally point until authorized to leave by the SSC.

## **9.8 Critique of Response and Follow-up**

A follow-up meeting will be held after any emergency situation to assess the actions taken. The meeting will be attended by the SSC and other individuals as appropriate. A record of the meeting will be kept by the SSC. Recommendations from the meeting will be incorporated into the future responses to emergency situations.

## **10.0 Team Member Responsibilities**

### **10.1 Managerial Responsibility**

#### **10.1.1 Health and Safety Manager**

The health and safety manager (HSM) is responsible for providing the PM with assistance and support with regard to all regulatory and safety aspects of site activity.

#### **10.1.2 Project Manager**

The BVWS project manager (PM) is responsible for technical direction and overall project administration. As a part of that function, the PM will ensure that, at a minimum, BVWS's project plans meet OSHA requirements and that the health and safety of all site personnel are a primary concern.

### **10.2 Team Organization/Responsibility**

The following personnel organization is critical to the planned activities at the site. The organizational structure is assigned and will be reviewed and updated periodically, by the PM.

#### **10.2.1 Site Manager**

The BVWS site manager (SM) is responsible for leading the team in the planned field activities. The responsibilities include close attention to site conditions as they may affect the health and safety of all team members during their onsite activities. The SSC will assist the SM in the site activities.

#### **10.2.2 Site Safety Coordinator**

The site safety coordinator (SSC) has total responsibility for ensuring that the provisions of the site and task HASPs are adequate and implemented in the field. Changing field conditions may require decisions to be made concerning adequate protection programs. Therefore, it is vital that personnel assigned as SSC be experienced and meet the additional training requirements specified by OSHA in 29 CFR 1910.120 and the BVWS Safety and Health Program. The SSC is also responsible for conducting site inspections on a regular basis to ensure the effectiveness of the site HASP.

### **10.2.3 Field Team**

The field team is the BVWS team personnel responsible for performing the activities described in the site and task HASPs under the SM's oversight. Each member is expected to handle the assigned duties with attention to the inherent hazards involved. All field team members agree to adhere to the provisions in the site and task HASPs.

## 11.0 Certification

All field team members are required to read and familiarize themselves with the contents of this site HASP and then to document their competency through the entry of a signature and date on the section below. Any changes to the site HASP will be made in accordance with Section 12.0, Record of Changes.

By my signature, I certify that:

- I have read,
- I understand and
- I will abide by the Health and Safety Plan for the American Chemicals, Inc. site,

Printed Name	Signature	Date	Affiliation



## 12.0 Record of Changes

Changes to this site HASP must be made on the following form and submitted to the BVWS PM and HSM for their approval. Field activities related to the potential for exposure to contaminants shall be halted until the site HASP has been modified to reflect changed conditions and the BVWS HSM has reviewed or approved the changes. All field team members who are affected by the changes must initial that they have been apprised of the changes.

Revision Number	Subject	Section/Page	Initials/Date

HSPLAN

## Appendix A

### Task Health and Safety Plan (HASP) American Chemical Services, Inc. Site

Prepared by: Robert M Lantz Date: 8/23/95  
Robert Lantz  
(Project Engineer)

Reviewed by: SMH Date: 8/23/95  
Steve Mrkvicka  
(Project Manager)

Approved by: Jack Schill Date: 8/23/95  
Jack Schill, CIH, CSP  
(BVWS HSM)

Expiration Date: December 30, 1996

The following task HASP contains health and safety information specific to the tasks described within. This task HASP is an extension of the HASP and as such must be used in conjunction with that document.

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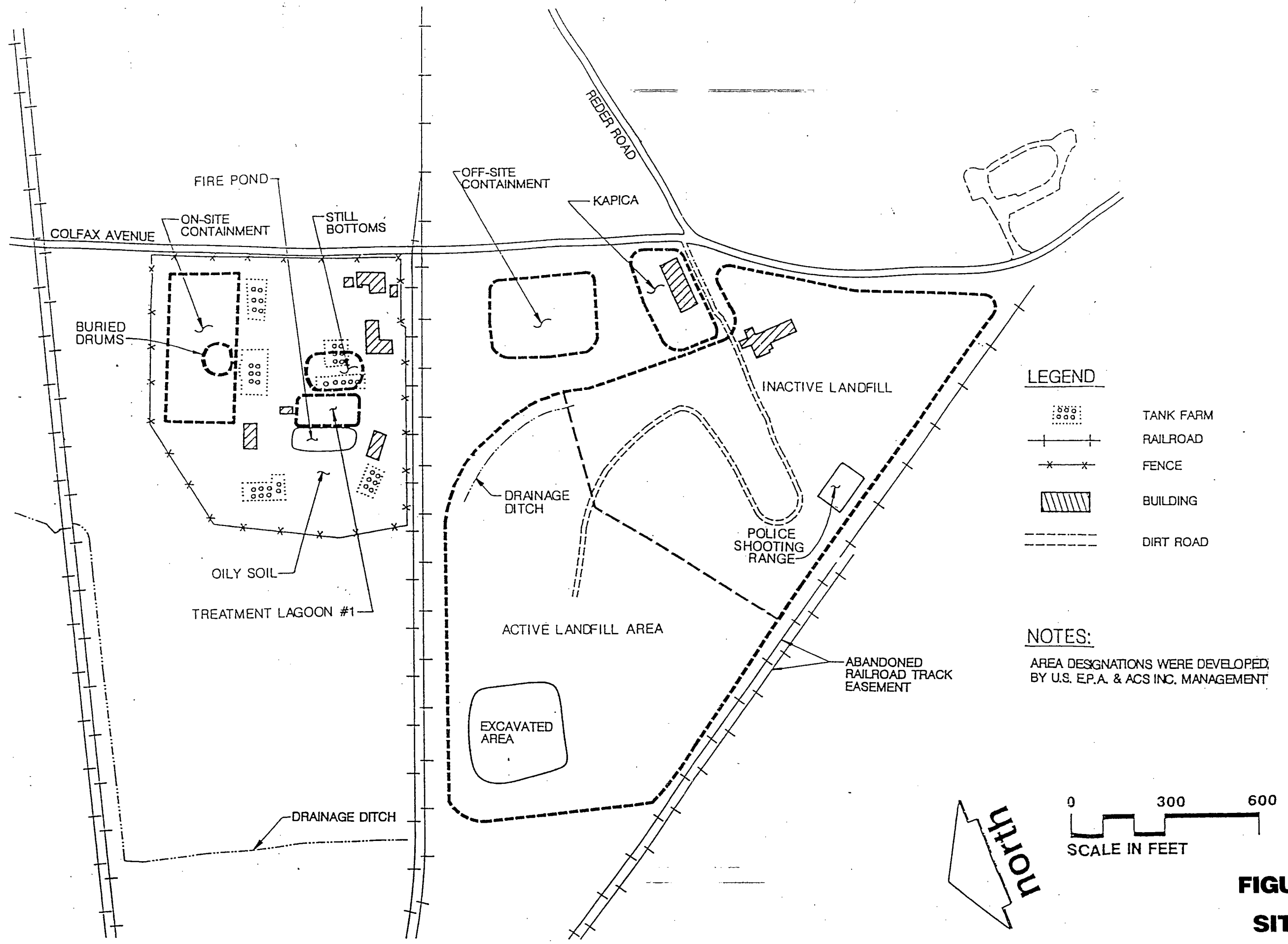
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## **1.0 Scope of Investigative Work**

This Task HASP shall apply to all BVWS members performing oversight activities at the American Chemical Services, Inc. (ACS) site. The following activities will require oversight:

- Monitoring well and piezometer water level measurements.
- Source area delineation and upper groundwater plume delineation with subsurface soil sampling equipment.
- Monitoring well installation and sampling.

The remedial action activities are scheduled to begin in late August 1995 and last through December 1996. Figure A-1 is the site plan that shows the specific work areas.



**FIGURE A-1**  
**SITE MAP**

## 2.0 Site Characteristics

### 2.1 Facility Description

The ACS site is located in the town of Griffith, Lake County, Indiana. Figure A-1 is a site map. Developed land around the site is used for single family residences and industrial purposes. The site is located at and near 420 South Colfax Avenue, Griffith, Indiana, and includes the 19-acre ACS property, the 2-acre Pazmey Corporation property (formerly Kapica Drum, Inc., and now owned by Darija Djurovic), and the 15-acre inactive portion of the Griffith Municipal Landfill.

### 2.2 Nature and Extent of Hazardous Materials

Investigation activities have been conducted at the ACS site from 1989-1994. The activities have indicated the presence of contaminated groundwater, soil and other sources. Contamination in the surface soils (i.e., primarily polychlorinated biphenyls (PCBs)) was observed in the area of the site west of the fire pond. Contamination in the surface and subsurface soils, (including drums and other source materials) have been observed in the onsite-containment area, the off-site containment area, and the spill bottoms area.

The baseline risk assessment identified the following chemicals of concern in groundwater.

- |                             |                              |
|-----------------------------|------------------------------|
| • Chloromethane             | • Bis(2-chloroethyl)ether    |
| • Vinyl Chloride            | • 1,4-Dichlorobenzene        |
| • Methylene Chloride        | • 4-Methylphenol             |
| • Acetone                   | • Isophorone                 |
| • 1,1-Dichloroethane        | • Pentachlorophenol          |
| • 1,2-Dichloroethene (cis-) | • Bis(2-ethylhexyl)phthalate |
| • 2-Butanone                | • PCBs                       |
| • Trichloroethene           | • Arsenic                    |
| • Benzene                   | • Beryllium                  |
| • 4-Methyl-2-Pentanone      | • Manganese                  |
| • Tetrachloroethene         | • Thallium                   |
| • Ethylbenzene              |                              |

The baseline risk assessment identified the following chemicals of concern in soil.

- |                  |                           |
|------------------|---------------------------|
| • Chloroethane   | • Bis(2-chloroethyl)ether |
| • Vinyl Chloride | • 1,4-Dichlorobenzene     |

- Methylene Chloride
- Acetone
- 1,2-Dichloroethane
- 1,2-Dichloroethene (cis-)
- 2-Butanone
- Trichloroethene
- Benzene
- 4-Methyl-2-Pentanone
- Tetrachloroethene
- Styrene
- 1,1-Dichloroethene
- Carbon Tetrachloride
- Chloroform
- 1,2-Dichloropropane
- Toluene
- 1,1,1-Trichloroethane
- 1,1,2,2-Trichloroethane
- Chlorobenzene
- Xylene
- Antimony
- Cadmium
- Chromium
- Lead
- cPAHs
- Isophorone
- Pentachlorophenol
- Bis(2-ethylhexyl)phthalate
- PCBs
- 2,4-Dinitrotoluene
- Hexachlorabutadiene
- Hexachlorobenzene
- n-Nitrosodiphenylamine
- 2,6-Dinitrotoluene
- Naphthalene
- Di-n-butylphthalate
- 1,2,4-Trichlorobenzene
- Aldrin
- 4,4,4-DDD
- 4,4,4-DDE
- 4,4,4-DDT
- Heptachlor Epoxide
- Endosulfan I
- Alpha-BHC
- Gamma-BHC
- Beta-BHC

## 2.3 Summary of Previous Site Activities

ACS began operations in 1955 as a solvent recovery firm. ACS was later involved in chemical manufacturing and operated for a limited time as a Resource Conservation and Recovery Act (RCRA) facility. Several areas of the property were used for disposal of hazardous wastes. In 1990, ACS ceased solvent reclaiming activities after losing interim status under RCRA. Today, ACS operates as a chemical manufacturer.

A ROD was issued by USEPA on September 30, 1992. The major components of the selected remedy include:

- Groundwater pump and treatment system to dewater the site and to contain the contaminant plume with subsequent discharge of the treated groundwater to surface water and wetlands.



- Fencing the site and implementing deed and access restrictions and deed notices.
- In-situ vapor extraction pilot study of buried waste in the onsite area.
- Excavation of approximately 400 drums in the onsite containment area for offsite incineration.
- Excavation of buried waste materials/source areas and treatment by LTTT. Treatment residuals meeting performance standards will be placed onsite.
- Onsite treatment or offsite disposal of treatment condensate.
- Vapor emission control during excavation and possible immobilization of inorganic contaminants after LTTT.
- Offsite disposal of miscellaneous debris.
- In-situ vapor extraction of contaminated soils.
- Continued evaluation and monitoring of wetlands and, if necessary, remediation of wetlands.
- Long term groundwater monitoring.
- Private well sampling with possible well closures or groundwater use advisories.

The USEPA was unable to secure a voluntary settlement with the PRPs; however, USEPA issued a UAO for RD/RA on September 30, 1994, to the Respondents. The PRPs have indicated that their intention is to comply with the terms of the UAO.

## 3.0 Hazard Assessment

### 3.1 Hazard Analysis

Before the beginning of each major phase of work, an activity hazard analysis shall be prepared. A major phase of work is defined as operations involving a type of work presenting hazards not experienced in previous operations or where a new subcontractor or work crew is to perform. A hazard analysis of the task and subsequent steps is presented in Table A-1.

- Description of activity or job task to be performed: Oversight of remedial action activities, including monitoring well and piezometer water level measurements; source area delineation and upper groundwater plume delineation with subsurface soil sampling equipment; and monitoring well installation and sampling.
- Planned duration of events: 1.5 years
- Season of activity: Fall 1995 to Winter 1996.
- Workday hours: 8 to 12 hours (task-dependent).

### 3.2 Chemical Hazards

The baseline risk assessment identified the following chemicals of concern in groundwater.

- |                             |                              |
|-----------------------------|------------------------------|
| • Chloromethane             | • Bis(2-chloroethyl)ether    |
| • Vinyl Chloride            | • 1,4-Dichlorobenzene        |
| • Methylene Chloride        | • 4-Methylphenol             |
| • Acetone                   | • Isophorone                 |
| • 1,1-Dichloroethane        | • Pentachlorophenol          |
| • 1,2-Dichloroethene (cis-) | • Bis(2-ethylhexyl)phthalate |
| • 2-Butanone                | • PCBs                       |
| • Trichloroethene           | • Arsenic                    |
| • Benzene                   | • Beryllium                  |
| • 4-Methyl-2-Pentanone      | • Manganese                  |
| • Tetrachloroethene         | • Thallium                   |
| • Ethylbenzene              |                              |

The baseline risk assessment identified the following chemicals of concern in soil.

- |                  |                           |
|------------------|---------------------------|
| • Chloroethane   | • Bis(2-chloroethyl)ether |
| • Vinyl Chloride | • 1,4-Dichlorobenzene     |

- Methylene Chloride
- Acetone
- 1,2-Dichloroethane
- 1,2-Dichloroethene (cis-)
- 2-Butanone
- Trichloroethene
- Benzene
- 4-Methyl-2-Pentanone
- Tetrachloroethene
- Styrene
- 1,1-Dichloroethene
- Carbon Tetrachloride
- Chloroform
- 1,2-Dichloropropane
- Toluene
- 1,1,1-Trichloroethane
- 1,1,2,2-Trichloroethane
- Chlorobenzene
- Xylene
- Antimony
- Cadmium
- Chromium
- Lead
- cPAHs
- Isophorone
- Pentachlorophenol
- Bis(2-ethylhexyl)phthalate
- PCBs
- 2,4-Dinitrotoluene
- Hexachlorabutadiene
- Hexachlorobenzene
- n-Nitrosodiphenylamine
- 2,6-Dinitrotoluene
- Naphthalene
- Di-n-butylphthalate
- 1,2,4-Trichlorobenzene
- Aldrin
- 4,4,4-DDD
- 4,4,4-DDE
- 4,4,4-DDT
- Heptachlor Epoxide
- Endosulfan I
- Alpha-BHC
- Gamma-BHC
- Beta-BHC

Table A-1 Hazard Analysis						
Principle Steps	Potential Safety or Health Hazards	Monitoring Requirements	Action Levels	Personal Protective Equipment	Recommended Controls	Training Requirements
Oversight of Monitoring well and piezometer water level measurements	Heat/cold stress. Slips, trips, and falls. Vehicles and traffic.	None required.	Not Applicable	Modified Level D*.	Stand 10 feet upwind of the monitoring well during sampling; maintain safe work practices.	No modification from Site HASP
Oversight of Source area delineation and upper groundwater plume delineation with subsurface soil sampling equipment	Heat/cold stress. Slips, trips, and falls. Vehicles and traffic. Electrical sources.	None required.	In instances where the oversight personnel must stand in close proximity of contaminated soil or groundwater.	Modified Level D*. Upgrade to Level D will occur when appropriate action levels are exceeded.	Stand 10 feet upwind of sampling device during sampling; maintain safe work practices.	No modification from Site HASP
Oversight of Monitoring well installation and sampling	Heat/cold stress. Slips, trips, and falls. Vehicles and traffic.	None required.	In instances where the oversight personnel must stand in close proximity of contaminated soil or groundwater.	Modified Level D*. Upgrade to Level D will occur when appropriate action levels are exceeded.	Stand 10 feet upwind of monitoring well during installation and sampling;; maintain safe work practices.	No modification from Site HASP

\* Modified Level D is defined in Section 5.0 of the Task HASP.

### **3.3 Physiological Hazards**

- Heat/cold stress.
- Strains and sprains.
- Fatigue.
- Cuts.

### **3.4 Physical Hazards**

- Slips, trips, and falls.
- Vehicles and traffic.
- Heavy equipment operation.
- Electrical sources.

### **3.5 Hazards Posed by Onsite Activities**

Potential hazards include chemical exposure to soil cuttings during drilling of soil borings, and chemical exposure from liquid splash contact. Due to the nature of oversight work, the occurrence of these potential hazards is considered remote.

### **3.6 Overall Hazard Level**

During the performance of the work, the potential for exposure to contaminants by inhalation or direct skin contact, the potential for accidents due to mechanical failure or operator negligence is considered to be low. To minimize hazards, safe work practices will be maintained during all site activities and BVWS personnel will stand upwind during these activities.

## **4.0 Personnel Qualifications**

The standard qualifications presented in section 4.0 of the Site HASP apply.

## **5.0 Personal Protective Equipment**

The required personal protective equipment (PPE) for the different action levels is discussed in Section 5.0 of the Site HASP. The remedial action oversight activities will be conducted in Modified Level D, which consists of work clothes, hardhat, safety glasses, gloves and boots. In instances where the oversight personnel must stand in close proximity of contaminated soil or groundwater, Level D PPE, as specified in Section 5.0 of the Site HASP, will be donned.

## **6.0 Monitoring Program**

The monitoring program for the remedial action oversight activities is described in Section 6.0 of the Site HASP.

## **7.0 Site Control**

The SSC will define the Exclusion Zone, Contaminant Reduction Zone, and Support Zone before field activities begin at each sampling location. The Exclusion Zone, which will include the task work zone, will be no less than a 10-foot radius from the monitoring well location while sampling is being performed, and no less than a 20-foot radius from the soil boring while drilling is being performed.

When in Level D PPE, entry into and exit from the Exclusion Zone for all personnel and equipment will be made through the Contaminant Reduction Zone. Before entering the Support Zone, personnel will decontaminate and remove their equipment.

## **8.0 Safety and Emergency Procedures**

No changes from the Site HASP.

## **9.0 Emergency Action Plan**

The local Fire Department will be contacted regarding a potential response to a hazardous waste site emergency. The local Fire Department and emergency phone numbers are included in Attachment 1. In case of emergency, the rally point will be outside the exclusion zone in a location identified by the SSC before site activities begin.

## **10.0 Team Member Responsibilities**

The BVWS field team will consist of at least a single representative that will perform the duties of site manager and SSC described in the Site HASP. The buddy system requirements outlined in the Site HASP will be performed using the American Chemical Services, Inc. potentially responsible party contractor personnel.

## 11.0 Certification

All field team members are required to read and familiarize themselves with the contents of this task HASP and to document their competency through the entry of a signature and date on the section below. Any changes to the Task HASP will be made in accordance with Section 12.0, Record of Changes.

By my signature, I certify that:

- I have read,
- I understand and
- I will abide by the Task HASP for the American Chemical Services, Inc. site.

Printed Name	Signature	Date	Affiliation



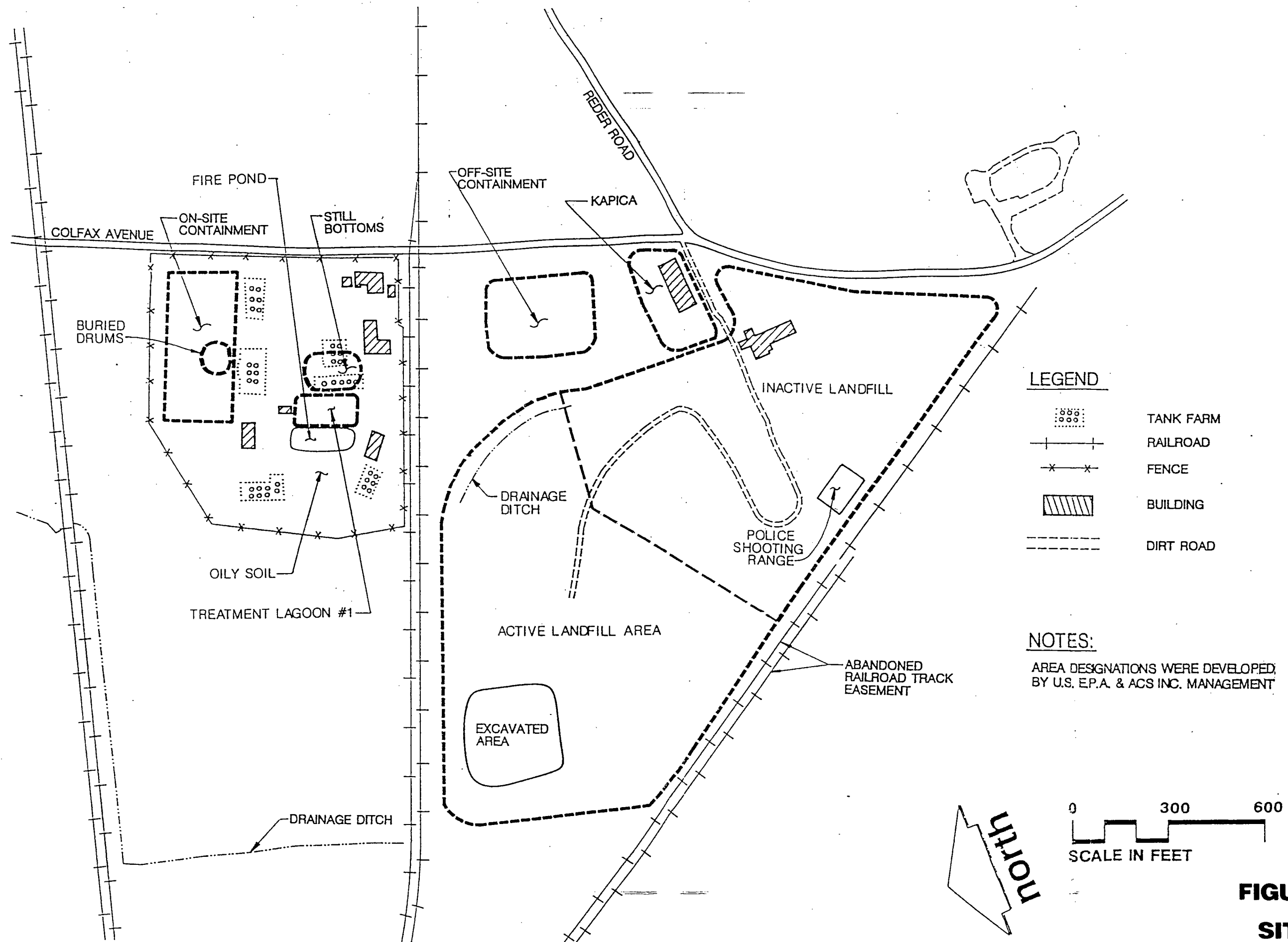
## 12.0 Record of Changes

Changes to this task HASP must be made on the following form and submitted to the BVWS Project Manager and HSM for their approval. Field activities related to the potential for exposure to contaminants shall be halted until the task HASP has been modified to reflect changed conditions and the BVWS HSM has reviewed or approved the changes. All field team members who are affected by the changes must initial that they have been apprised of the changes.

Revision Number	Subject	Section/Page	Initials/Date

Attachment 1  
Emergency Information

American Chemical Services, Inc.



## Hospital Emergency Route

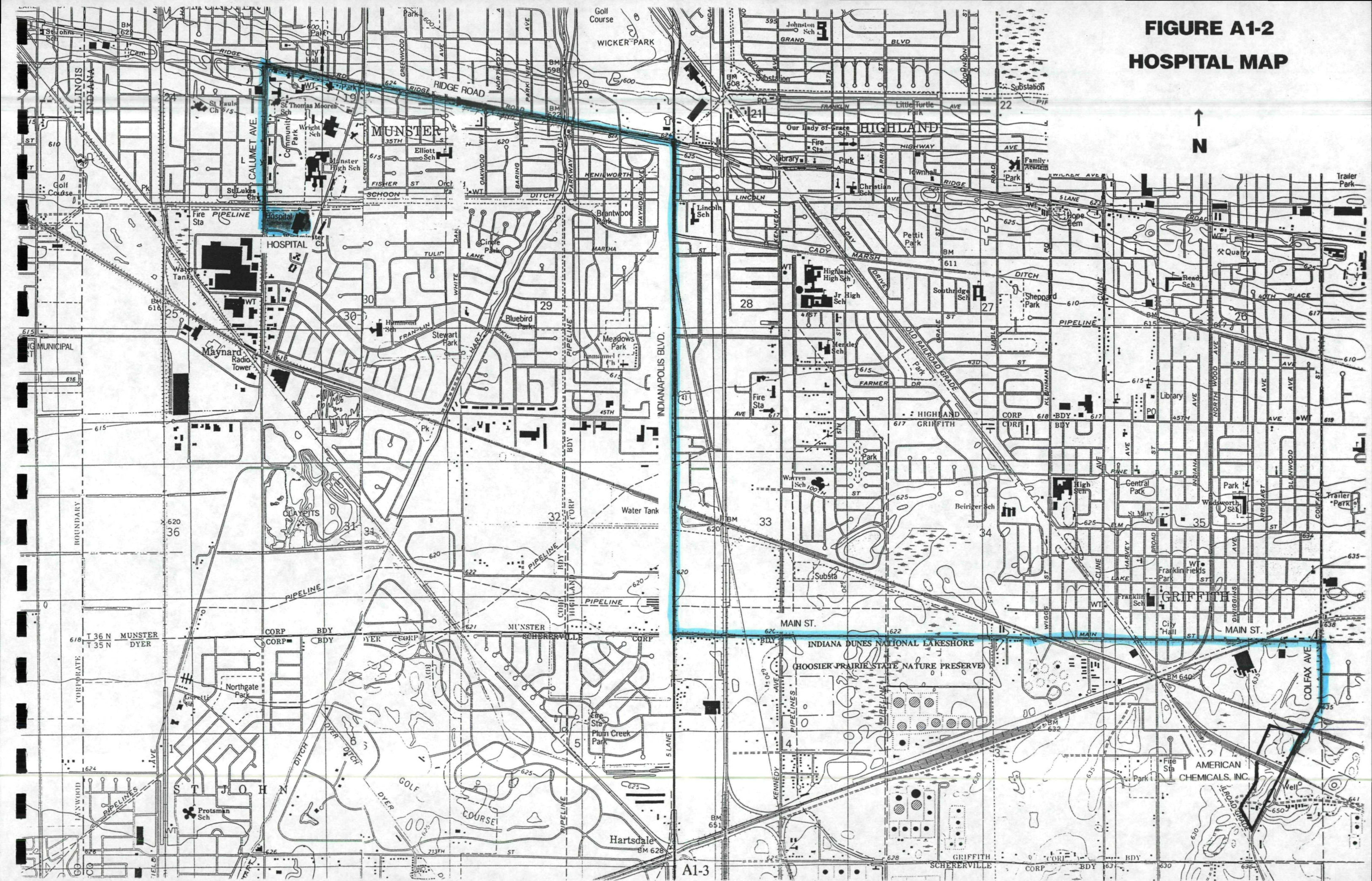
Route to: **Munster Community Hospital**  
901 McArthur Boulevard  
Munster, Indiana  
Phone: (219) 836-1600

See the following page (Figure A1-2) for hospital route.

- From the American Chemicals, Inc. site proceed north on Colfax Avenue for approximately 0.5 mile to Main Street.
- Turn left (west) on Main Street for approximately 2.25 miles to Indianapolis Boulevard (Route 41).
- Turn right (north) on Indianapolis Boulevard (Route 41) and proceed approximately 2 miles to Ridge Road.
- Turn left (west) on Ridge Road and proceed 1 mile to Calumet Avenue.
- Turn left (south) onto Calumet Avenue and proceed approximately 0.5 miles.
- The hospital emergency entrance is on east (left) side of street, just past Fisher Street.



**FIGURE A1-2**  
**HOSPITAL MAP**





## Emergency Contacts

Organization	Name	Position	Phone Number
Fire			911 or *999
Hospital	Munster Community Hospital	Emergency Room	(219) 836-1600
Ambulance			911 or *999
Police/Sheriff			911 or *999
BVWS	Steve Mrkvicka	Project Manager	(312) 346-3775 (w) (708) 383-7911 (h)
	Jack Schill, CIH, CSP	Health and Safety Manager	(913) 338-6595 (w) (816) 224-2406 (h)
	Diane S. Mettenbrink	Worker's Compensation Administration	(913) 339-8561
Local Provider: U.S. Occupational Health (Chicago BVWS Medical Records)	Dr. Barry L. Fischer, M.D., S.C.	Consulting Physician	(312) 641-1449
24 Hour Contact: EMR Medical Management Services	Mary Brake		1-800-229-3674
U.S. Environmental Protection Agency	Sheri Bianchin	USEPA Work Assignment Manager	(312) 886-4745
USEPA National Response Center			1-800-424-8802
USEPA Regional Response Center			(312) 353-2318
Utilities			1-800-382-5544
Wexford County Emergency Preparedness			(616) 775-7601
Poison Information Center			1-800-442-4571

Attachment 2  
Chemicals of Concern and Applicable Regulatory Standards

American Chemical Services, Inc.

Chemicals of Concern and Applicable Regulatory Standards at Site Name					
	Contaminant	Exposure Route	TWA Exposure Limits	IDLH	Hazard/Symptoms
Volatiles	Acetone CAS # 67-64-1	Inhalation, Ingestion, Contact	TLV: 750 ppm PEL: 750 ppm	20,000 ppm	Irritation of eyes, nose, throat, respiratory system; headaches, dizziness, dermatitis
	1,1-Dichloroethane CAS # 75-34-3	Inhalation, Ingestion, Contact	TLV: 100 ppm PEL: 100 ppm	4,000 ppm	Central nervous system depression; skin irritation; liver and kidney damage
	1,1-Dichloroethene CAS # 75-34-4	Not Listed	TLV: 5 ppm PEL: 1 ppm NIOSH: Carcinogen (LOQ 0.4 ppm)	Not Listed	Not Listed
	1,2-Dichloroethane CAS # 107-06-2	Inhalation, Absorption, Ingestion, Contact	TLV: 10 ppm PEL: 1 ppm NIOSH: Carcinogen		Dermatitis, eye damage, nausea, vomiting, mental confusion, dizziness, pulmonary edema; liver, kidney damage
	1,2-Dichloroethene (cis-) CAS # 540-59-0	Inhalation, Ingestion, Contact	TLV: 200 ppm PEL: 200 ppm	4,000 ppm	Irritated eyes, respiratory system; Central nervous system depression
	Benzene CAS # 71-43-2	Inhalation, Skin Absorption, Ingestion, and Skin and/or Eye Contact	TLV: 10 ppm PEL: 1 ppm	3,000 ppm Carcinogen	Irritation of eyes, nose, respiratory system; giddiness, headaches, nausea; staggered gait; fatigue; lassitude; dermatitis; bone marrow depression; abdominal pain
	2-Butanone (MEK) CAS # 78-93-3	Ingestion, Skin Contact	TLV: 200 ppm PEL: 200 ppm	3,000 ppm IDLH	Irritation of eyes, nose; headache, dizziness, vomiting
	Carbon Tetrachloride CAS # 56-23-5	Inhalation, Skin or Eye Absorption, Ingestion	TLV: 5 ppm PEL: 2 ppm	300 ppm Carcinogen	Central nervous system depressant; nausea, vomiting, liver, kidney damage; skin irritant
	Chlorobenzene CAS # 108-90-7	Inhalation, Ingestion, Skin and/or Eye Contact	TLV: 10 ppm PEL: 75 ppm	2,400 ppm	Irritation of skin, eyes, nose; drowsiness, incoordination, liver damage
	Chloroform CAS # 67-66-3	Inhalation, Ingestion, and Skin or Eye Contact	TLV: 10 ppm PEL: 2 ppm	1,000 ppm Carcinogen	Dizziness, mental dullness, nausea, disorientation; headache, fatigue; anesthesia; eye and skin irritant
	1,2-Dichloropropane CAS # 78-87-5	Inhalation, Ingestion, Contact	TLV: 75 ppm PEL: 75 ppm NIOSH: Carcinogen (LOQ 0.03 ppm)	2000 ppm	Eye irritation; drowsiness, lightheadedness, irritation skin



Ethylbenzene CAS # 100-41-4	Inhalation, Ingestion, Skin/Eye Contact	TLV: 100 ppm PEL: 100 ppm	2,000 ppm	Irritation of eyes, mucous membranes; headache; dermatitis; narcosis, coma
Methylene Chloride CAS # 75-09-2	Inhalation, Ingestion, Contact	TLV: 50 ppm PEL: 500 ppm NIOSH: Carcinogen	5,000 ppm	Fatigue, weakness, sleepiness, light-headedness; numb or tingling limbs, nausea, eye irritation

Chemicals of Concern and Applicable Regulatory Standards at Site Name (Continued)					
	Contaminant	Exposure Route	TWA Exposure Limits	IDLH	Hazard/Symptoms
	Styrene CAS # 100-42-5	Inhalation, Ingestion, Contact	TLV: 50 ppm PEL: 50 ppm	5000 ppm	Eye, nose, throat irritation; drowsiness; weak unsteady gait; narcosis; defatting dermatitis
Volatiles (Continued)	Tetrachloroethene CAS # 127-18-4	Inhalation, Ingestion, Contact	TLV: 50 ppm PEL: 25 ppm NIOSH: Carcinogen	500 ppm	Eye, nose, throat irritation; nausea, flushed face/neck, vertigo, dizziness, incoherence, headache, somnolence
	1,1,2,2-tetrachloroethane CAS # 79-34-5	Inhalation, Skin or Eye Contact and Absorption, and Inhalation	TLV: 1 ppm PEL: 1 ppm (7 mg/m <sup>3</sup> ) REL: 1 ppm (7 mg/m <sup>3</sup> )	150 ppm Carcinogen	Nausea, vomiting, abdominal pain; tremors in fingers; jaundice, enlarged and tender liver; dermatitis; kidney damage
	Toluene CAS # 108-88-3	Inhalation, Absorption, Ingestion, Skin/Eye Contact	TLV: 50 ppm PEL: 100 ppm	2,000 ppm	Fatigue, weakness; confusion, euphoria, dizziness, headaches; dilated pupils; excess tearing of eyes, nervousness, muscle fatigue, insomnia; abnormal skin sensation, photophobia
	1,1,1-trichloroethane (Methyl chloroform) CAS # 71-55-6	Inhalation, Skin Absorption, Ingestion and Skin or Eye Contact	TLV: 350 ppm PEL: 350 ppm (1900 mg/m <sup>3</sup> ) REL: 350 ppm (1900 mg/m <sup>3</sup> )	1,000 ppm	Dizziness, incoordination, irritating to eyes, drowsiness, increased reaction time, unconsciousness
	Trichloroethene CAS # 79-01-6	Inhalation, Ingestion, Contact	TLV: 50 ppm PEL: 50 ppm NIOSH: Carcinogen	1,000 ppm	Head, vertigo; vision disturbance, tremors, somnolence, nausea, vomiting; irritation eyes; dermatitis; cardiac arrhythmias, paresthesia
	Vinyl Chloride CAS # 75-01-4	Inhalation	TLV: 5 ppm PEL: 1 ppm REL: lowest reliably detectable concentration	Carcinogen	Weakness, abdominal pain, gastro intestinal bleeding; pallor of extremities
	Xylenes (Total) CAS # 1330-20-7	Inhalation, Absorption, Ingestion, Skin/Eye Contact	TLV: 100 ppm PEL: 100 ppm	1,000 ppm	Dizziness, excitement, drowsiness, incoordination, staggering gait; irritation of eyes, nose, throat; anorexia; nausea; vomiting, abdominal pain
Semivolatiles	1,2-Dihydro- Acenaphthylene (PAH) CAS # 83-32-9	Inhalation, Ingestion	TLV: 0.2 mg/m <sup>3</sup> Human Carcinogen		Irritating to skin and mucous membranes; vomiting; increased incidence of lung cancer
	Anthracene (PAH) CAS # 120-12-7	Inhalation	TLV: 0.2 mg/m <sup>3</sup> Human Carcinogen		Skin irritation; increased incidence of lung cancer

Chemicals of Concern and Applicable Regulatory Standards at Site Name (Continued)					
	Contaminant	Exposure Route	TWA Exposure Limits	IDLH	Hazard/Symptoms
Semivolatiles (Continued)	Benzo[a]anthracene (PAH) CAS # 56-55-3	Inhalation	TLV: 0.1 mg/m <sup>3</sup> Human Carcinogen		Skin irritation; increased incidence of lung cancer
	Benzo[b]fluoranthene (PAH) CAS # 205-99-2	Inhalation	TLV: 0.2 mg/m <sup>3</sup> Human Carcinogen		Skin irritation; increased incidence of lung cancer
	Benzo[k]fluoranthene (PAH) CAS # 207-08-9	Inhalation	TLV: 0.2 mg/m <sup>3</sup> Suspected Human Carcinogen		Skin irritation; increased incidence of lung cancer
	Benzo[g,h,i]perylene (PAH) CAS # 191-24-2	Inhalation	TLV: 0.2 mg/m <sup>3</sup>		Irritant to skin and lungs, potential carcinogen
	Benzo[a]pyrene (PAH) CAS # 50-32-8	Inhalation	TLV: 0.2 mg/m <sup>3</sup>		Irritant to lungs and skin
	Bis-(2-chloroethyl) ether CAS # 117-81-7	Inhalation	TLV: 5 mg/m <sup>3</sup> Carcinogenic		Irritant to eyes and mucous membranes
	Bis-(2-ethylhexyl) phthalate (Dioctyl Phthalate) CAS # 117-81-7	Inhalation	TLV: 5 mg/m <sup>3</sup> Carcinogenic		Irritant to eyes and mucous membranes
	Chrysene (PAH) CAS # 218-01-9	Inhalation	TLV: 0.2 mg/m <sup>3</sup> PEL: 0.2 mg/m <sup>3</sup> Human Carcinogen		Irritant to skin, increased incidence of lung cancer
	Dibenzofuran CAS # 132-64-9	Inhalation, Ingestion, Skin/Eye Contact	Lowest feasible concentration		By analogy treat as dioxin
	Dibenzo(a,h)perylene (PAH) CAS # Unable to locate	Inhalation	TLV: 0.2 mg/m <sup>3</sup> ACGIH		Potentially carcinogenic, irritant to skin and lungs

	1,4-Dichlorobenzene CAS # 106-46-7	Inhalation, Ingestion, Contact	TLV: 10 ppm PEL: 75 ppm NIOSH: Carcinogen (LOQ 1.7 ppm)	1000 ppm	Headache; eye irritation, swell periorbital; profuse rhinitis; anorexia, nausea, vomiting, weight loss, jaundice, cirrhosis
	Di-n-butyl phthalate CAS # 84-74-2	Inhalation, Ingestion, Contact	TLV: 5 mg/m <sup>3</sup> PEL: 5 mg/m <sup>3</sup>	125 ppm	Irritation to upper respiratory tract and stomach
	Dinitrotoluene CAS # 25321-14-6	Inhalation, Ingestion, Contact, Absorption	TLV: 0.15 mg/m <sup>3</sup> PEL: 1.5 mg/m <sup>3</sup> NIOSH: Carcinogen (skin)	200 mg/m <sup>3</sup>	Anoxia, cyanosis, anemia, jaundice
	Fluoranthene (PAH) CAS # 206-44-0	Inhalation	TLV: 0.2 mg/m <sup>3</sup> Human Carcinogen		Irritant to skin, increased incidence of lung cancer
	Fluorine (PAH) CAS # 7782-41-4	Inhalation	TLV: 0.2 mg/m <sup>3</sup> Human Carcinogen		Irritant to skin, increased incidence of lung cancer
Chemicals of Concern and Applicable Regulatory Standards at Site Name (Continued)					
	Contaminant	Exposure Route	TWA Exposure Limits	IDLH	Hazard/Symptoms
	Hexachlorabutadiene CAS # 87-68-3	Not Listed	TLV: 0.02 ppm PEL: 0.02 ppm Carcinogen, skin	Not Listed	Not Listed
	Hexachlorobenzene CAS # 118-74-1	Not Listed	TLV: 0.025 mg/m <sup>3</sup>	Not Listed	Not Listed
Semivolatiles (Continued)	Indeno[1,2,3-cd]pyrene CAS # 193-39-5	Inhalation	TLV: 0.2 mg/m <sup>3</sup> PEL: --- Possible Human Carcinogen		Irritant to skin and lungs
	Isophorone CAS # 78-59-1	Inhalation, Ingestion, Contact	PEL: 4 ppm NIOSH: 4 ppm	800 ppm	Irritation to eyes, nose, throat; narcosis; dermatitis
	4-Methylphenol (p-Cresol) CAS # 106-44-5	Inhalation, Absorption, Ingestion, Skin Contact	TLV: 10 ppm PEL: 5 ppm REL: 2.3 ppm	250 ppm	Confusion, depression, respiratory failure/ difficulty, weakness, skin and eye burns, dermatitis
	N-nitrosodiphenylamine CAS #	Not Listed	Not Listed	Not Listed	Not Listed

Naphthalene CAS # 91-20-3	Inhalation, Ingestion, Skin Contact	REL/PEL: 10 ppm	500 ppm	Eye irritation, headache, confusion, excitement, malaise, nausea, vomiting, abdominal pain, irritation of bladder, profuse sweating, jaundice, kidney shutdown, dermatitis
Phenanthrene (PAH) CAS # 85-01-8	Inhalation	TLV: 0.2 mg/m <sup>3</sup> Human Carcinogen		Skin irritation, increased incidence of lung cancer
Pentachlorophenol CAS # 87-86-5	Inhalation, Absorption, Ingestion, Skin Contact	TLV: 0.5 mg/m <sup>3</sup> PEL: 0.5 mg/m <sup>3</sup>	150 mg/m <sup>3</sup>	Irritation to eyes, nose, throat; sneezing, coughing, weakness, anorexia, weight loss, sweating, headache, dizziness, nausea, vomiting
Pyrene (PAH) CAS # 129-00-0	Inhalation	TLV: 0.2 mg/m <sup>3</sup> Human Carcinogen		Skin irritation, increased incidence of lung cancer
1,2,4-Trichlorobenzene CAS # 120-82-1	Not Listed	Not Listed	Not Listed	Not Listed
Aldrin CAS # 309-00-2	Inhalation, Absorption, Ingestion, Skin Contact	TLV: 0.25 mg/m <sup>3</sup> PEL: 0.25 mg/m <sup>3</sup> Ca; skin	100 mg/m <sup>3</sup>	Headaches; dizziness; nausea; vomiting; malaise; myoclonic jerks of limbs; clonic, tonic convulsions; coma
Alpha Chlordane CAS # 57-74-9	Inhalation, Absorption, Ingestion, Skin/Eye Contact	TLV: 0.5 mg/m <sup>3</sup> PEL: 0.5 mg/m <sup>3</sup> Probable Human Carcinogen	500 mg/m <sup>3</sup>	Blurred vision, confusion, incoordination, delirium, cough, abdominal pain, nausea, vomiting, diarrhea, irritability, tremor, convulsions, failure to urinate
Aroclor 1248 CAS # 12672-29-6	Skin and/or Eye Contact	REL: 0.001 mg/m <sup>3</sup>		Suspected human carcinogen

Chemicals of Concern and Applicable Regulatory Standards at Site Name (Continued)					
	Contaminant	Exposure Route	TWA Exposure Limits	IDLH	Hazard/Symptoms
Pesticides/ PCBs (Continued)	Aroclor 1254 CAS # 11097-69-1	Skin/Eye Contact, Ingestion	REL: 0.001 mg/m <sup>3</sup> Carcinogen	5 mg/m <sup>3</sup>	Poison by intravenous routes, moderately toxic by ingestion
	1,1'-(Dichloroe- thenylidene) bis[4- chlorobenzene] (DDE)				

Chemicals of Concern and Applicable Regulatory Standards at Site Name (Continued)					
	Contaminant	Exposure Route	TWA Exposure Limits	IDLH	Hazard/Symptoms
Pesticides/ PCBs (Continued)	4,4'-Dichlorodiphenyl- trichloroethane (DDT) CAS # 50-29-3	Inhalation, Absorption, Ingestion, Contact	TLV: 1 mg/m <sup>3</sup> PEL: 1 mg/m <sup>3</sup> Probable Human Carcinogen	No IDLH	Abnormal sensation in tongue, lips, face, hands; tremors, apprehension, dizziness, convulsions, vomiting, irritated eyes, skin
	Dieldrin CAS # 60-57-1	Inhalation, Absorption, Ingestion, Contact	TLV: 0.25 mg/m <sup>3</sup> PEL: 0.25 mg/m <sup>3</sup> Probable Human Carcinogen	450 mg/m <sup>3</sup>	Headache, dizziness, nausea, vomiting, malaise, sweating, limb jerking; clonic, tonic convulsions, coma, liver, kidney damage
	Heptachlor and Heptachlor Epoxide CAS # 76-44-8	Inhalation, Absorption, Ingestion, Contact	TLV: (0.5) mg/m <sup>3</sup> PEL: 0.5 mg/m <sup>3</sup> Probable Human Carcinogen	700 mg/m <sup>3</sup>	In animals: tremors, convulsions, liver damage

Chemicals of Concern and Applicable Regulatory Standards at Site Name (Continued)					
	Contaminant	Exposure Route	TWA Exposure Limits	IDLH	Hazard/Symptoms
Pesticides/ PCBs (Continued)	Polychlorinated Biphenyls (PCBs)	Inhalation of fume or vapor, Percutaneous Absorption of liquid, Ingestion, Eye and Skin Contact	REL: 1.0 mg/m <sup>3</sup>	5 mg/m <sup>3</sup> +0 10 mg/m <sup>3</sup>	Local-Prolonged skin contact may cause sebaceous cysts, and pustules, known as chloracne; irritation of eyes, nose, and throat may also occur; systemic-signs and symptoms include edema, jaundice, vomiting, anorexia, nausea, abdominal pains and fatigue
Inorganics	Antimony CAS # 7440-36-0	Inhalation, Contact	TLV: 0.5 mg/m <sup>3</sup> PEL: 0.5 mg/m <sup>3</sup>	80 mg/m <sup>3</sup>	Irritation of nose, throat, mouth; cough; dizziness, headache; nausea, vomiting, diarrhea, stomach cramps; insomnia, anorexia, irritated skin; cardiac abnormalities
	Arsenic CAS # 7440-38-2	Inhalation, Absorption, Contact, Ingestion	TLV: (0.2) mg/m <sup>3</sup> PEL: (0.01) mg/m <sup>3</sup> Human Carcinogen	100 mg/m <sup>3</sup>	Ulceration of nasal septum; dermatitis, gastro- intestinal disturbances; peripheral neuropathy; respiratory irritation, hyperpigmentation of skin
	Beryllium CAS # 7440-41-7	Inhalation	TLV: 0.002 mg/m <sup>3</sup> PEL: 0.002 mg/m <sup>3</sup> Probable Human Carcinogen	10 mg/m <sup>3</sup>	Respiratory symptoms, weakness, fatigue; weight loss



Chemicals of Concern and Applicable Regulatory Standards at Site Name (Continued)					
	Contaminant	Exposure Route	TWA Exposure Limits	IDLH	Hazard/Symptoms
Inorganics (Continued)	Cadmium CAS # 7440-43-9	Inhalation, Ingestion	TLV: (0.05) mg/m <sup>3</sup> PEL: 0.1 mg/m <sup>3</sup> Probable Human Carcinogen	50 mg/m <sup>3</sup>	Pulmonary edema, dyspnea, cough, chest tightness, substernal pain; headache; chills, muscle aches; nausea, vomiting, diarrhea, mild anemia
	Chromium CAS # 7440-47-3	Inhalation, Ingestion	TLV: 0.5 mg/m <sup>3</sup> PEL: 1 mg/m <sup>3</sup>	No IDLH	Histologic fibrosis of lungs, dermatitis, potential carcinogen
	Lead CAS # 7439-92-1	Inhalation, Ingestion, Skin/Eye Contact	TLV: 0.15 mg/m <sup>3</sup> PEL: 0.05 mg/m <sup>3</sup>	700 mg/m <sup>3</sup>	Weakness, lassitude, insomnia, facial pallor, anorexia, low-weight, constipation, abdominal pain, anemia, wrist and ankle paralysis
	Manganese CAS # 7439-96-5	Inhalation, Ingestion	TLV: 5 mg/m <sup>3</sup> (0.2) mg/m <sup>3</sup> Intended Change	No IDLH	Parkinson's disease, asthenia, insomnia, mental confusion; metal fume fever; dry throat, cough, tight chest, dyspnea, rashes, flu-like fever, low-back pain; vomiting; malaise; fatigue
	Thallium CAS # 7440-28-0	Inhalation, Ingestion, Skin/Eye Contact	TLV: 0.1 mg/m <sup>3</sup> PEL: 0.1 mg/m <sup>3</sup>	20 mg/m <sup>3</sup>	Parkinson's disease, asthenia, insomnia, mental confusion; metal fume fever; dry throat, cough, tight chest, dyspnea, rashes, flu-like fever, low-back pain; vomiting; malaise; fatigue

# Chemicals of Concern and Applicable Regulatory Standards

## Notes and Abbreviations

IDLH Source:	U.S. Department of Health and Human Services, NIOSH Pocket Guide, 1990.
OSHA PEL/Carcinogen/ACGIH TLV Sources:	American Conference of Government Industrial Hygienists, Guide to Occupational Exposure Values 1992.
OSHA PEL:	Occupational Safety and Health Administration Permissible Exposure Limit.
TWA:	Time-weighted average exposure concentration for normal 8-hour (TLV, PEL) or up to a 10-hour (REL) workday and 40-hour workweek.
IDLH	Immediately dangerous to life or health concentrations.
NE	No evidence could be found for the existence of an IDLH.
CNS	Central Nervous System
CVS	Cardiovascular System
PNS	Peripheral Nervous System
GI Tract	Gastrointestinal Tract
RBC	Red Blood Cell
Ing	Ingestion
Inh	Inhalation
Abs	Skin Absorption
Con	Skin and/or eye contact
(a)	From BVWS compilation of existing data pertinent to RA 2 Site, September 1993.
skin	Danger of cutaneous absorption.

### Carcinogen Designations:

TLV-A2:	Suspected human carcinogen, based on either limited epidemiologic evidence or demonstration.
EPA-B:	Probable Human Carcinogen; weight of evidence of human carcinogenicity based on epidemiologic studies is limited; agents for which weight of evidence of carcinogenicity based on animal studies is sufficient.
EPA-B-2:	Sufficient evidence from animal studies; inadequate evidence or no data from epidemiologic studies.
IARC-2A	Probably carcinogenic to humans; limited human evidence, sufficient evidence in experimental animals.
IARC-2B	Possibly carcinogenic to humans; limited evidence in humans in the absence of sufficient evidence in experimental animals.
MAK-A1	Capable of inducing malignant tumors as shown by experience with humans.
MAK-A2	Unmistakably carcinogenic in animal experimentation only.
NIOSH-X	Carcinogen defined with no further categorization.
NTP-2	Reasonably anticipated to be a carcinogen; limited evidence from studies in humans or sufficient evidence from studies in experimental animals.

Attachment 3  
Material Safety Data Sheets

American Chemical Services, Inc.

# **MSDS**

## **Table of Contents**

**See Montgomery-Watson Site Safety Plan**

Note: Although these are written by a specific manufacturer, they are not meant in any way to suggest that the waste products or contamination on the site come from that particular manufacturer. They are intended to be used solely as an approximation for the waste product to provide safety and health hazard information, including symptoms of exposure, first-aid procedures, and spill control measures.

Attachment 4  
Safety Meeting Checklist

American Chemicals, Inc.

# American Chemical Services, Inc. Safety Meeting Checklist

\_\_\_\_\_  
Site Safety Coordinator

\_\_\_\_\_  
Date

Attendee Initials

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

SSC Initials

- \_\_\_\_\_ Review Immediate and Pertinent Work Plans
- \_\_\_\_\_ Collect Current Medical Monitoring Certificates
- \_\_\_\_\_ Collect Current Respirator Fit Test Record
  - \_\_\_\_\_ Collect Current Training Certificates
  - \_\_\_\_\_ Hazardous Waste Operations 40 hr (OSHA 1910.120)
  - \_\_\_\_\_ Hazardous Waste Operations Refresher (OSHA 1910.120)
  - \_\_\_\_\_ Hazardous Waste Operations Supervisor (OSHA 1910.120)
  - \_\_\_\_\_ Confined Space Entry
  - \_\_\_\_\_ Air Supplied Respirators
  - \_\_\_\_\_ Monitoring Equipment (other than BVWS supplied)
  - \_\_\_\_\_ First Aid/CPR
  - \_\_\_\_\_ Other
- \_\_\_\_\_ Review Standing Safety Orders
- \_\_\_\_\_ Review personal protective equipment requirements
- \_\_\_\_\_ Review Emergency Action Plan
  - \_\_\_\_\_ Anticipated emergency response discussed
  - \_\_\_\_\_ Identify First Aid/CPR Trained Personnel to Team Members
  - \_\_\_\_\_ Personnel trained to respond identified to team
  - \_\_\_\_\_ Review Evacuation and Rally Procedures with Team Members
  - \_\_\_\_\_ Conduct Chemical Hazard Training for Team Members
  - \_\_\_\_\_ Detection Methods
  - \_\_\_\_\_ Protective Measures
  - \_\_\_\_\_ Location of MSDS
  - \_\_\_\_\_ Labeling System used onsite
  - \_\_\_\_\_ Signs/Symptoms of Overexposure
  - \_\_\_\_\_ Review Communication Systems with Team Members
  - \_\_\_\_\_ Internal System
  - \_\_\_\_\_ External System
- \_\_\_\_\_ Review Changes to HASP
- \_\_\_\_\_ Point Out Postings
  - \_\_\_\_\_ Emergency Phone List
  - \_\_\_\_\_ Hospital Emergency Route\Map
  - \_\_\_\_\_ OSHA Poster
  - \_\_\_\_\_ HASP
  - \_\_\_\_\_ Subcontractor Safety
- \_\_\_\_\_ MSDS Submitted to BVWS SSC
  - \_\_\_\_\_ Emergency equipment
  - \_\_\_\_\_ reference materials

Note: If an item is not applicable, insert "N/A".

**Safety briefings are to be held prior to initiating any site activity and at such times as necessary to ensure that employees are apprised of the site safety plan and that the plan is followed.**

Attachment 5  
Medical Monitoring Examination Elements

American Chemical Services, Inc.

## Medical Monitoring Examination Elements

### Baseline

- Medical History
- Respirator User Assessment
- Assessment for Hazardous Waste Worker
- Physical Examination
- Electrocardiogram (EKG)
- pulmonary function test
- chest X-ray
- Audiometry
- Vision Screen
- Stool Occult Blood
- Urinalysis
- Hematology
- Blood Chemistry
- Coagulation
- Physician discretion exams

### Annual

- Baseline minus the X-ray
- Physician discretion exams

### Exit

- Baseline minus EKG and respirator user assessment
- Physician discretion exams

### Physician Discretion exams

- Annual chest X-ray
- tetanus booster
- Serum PCB levels
- RBC Cholinesterase
- Plasma Cholinesterase
- Stress EKG
- 24 hr Dioxin in urine
- Heavy metals in urine



Attachment 6  
Monitoring Equipment Action Levels

American Chemical Services, Inc.

# Monitoring Equipment Action Levels

Instrument	Reading	Action
O <sub>2</sub> Meter (measure at source for LEL Meter, in breathing zone for PPE).	Less than 19.5% O <sub>2</sub> .	Withdraw. Ventilate with fresh air. Explosimeter readings <u>not</u> valid if O <sub>2</sub> < 10%.
	Greater than 23% O <sub>2</sub> .	Withdraw. Explosion hazard. Consult with BVWS HSM.
LEL Meter (measure at source)	Up to 5% LEL.	Continue activities.
	5-10% LEL.	Continue: ID source.
	Greater than 10% LEL.	Withdraw. Explosion hazard. Consult with BVWS HSM.
Organic Vapor Detector (PID or FID) (measure in breathing zone)	Background	Level D
	Up to 5 ppm above background.	Level C
	Greater than 5 ppm above background.	Withdraw. Consult with BVWS HSM.
Radiation Meter	Background	Continue activities.
	Greater than background.	Withdraw. Consult with BVWS HSM.
Hydrogen Cyanide Draeger Tube Electrochemical Instrument	Any indication.	Withdraw. Consult with BVWS HSM.
Dust Meter	Up to 2 mg/m <sup>3</sup> .	Level D, based on dust levels <u>only</u> .
	Greater than 2 mg/m <sup>3</sup> .	Level C, based on dust levels <u>only</u> .
Noise Meter	Up to 85 db	Continue activities.
	Greater than 85 db	Hearing protection required.

Attachment 7  
Personnel Decontamination

American Chemical Services, Inc.

Personnel Decontamination					
Method *	Surface	Action	Technique	Advantages	Disadvantages
Soap and water	Skin and hands	Emulsifies and dissolves contaminate	Wash 2-3 minutes and monitor. Do not wash more than 3-4 times.	Readily available and effective for most radioactive contamination.	Continued washing will defat the skin. Indiscriminate washing of other than affected parts may spread contamination.
Lava soap, soft brush, and water	Skin and hands	Emulsifies, dissolves, and erodes.	Use light pressure with heavy lather. Wash for 2 minutes, 3 times. Rinse and monitor. Use care not to scratch or erode the skin. Apply lanolin or hand cream to prevent chapping	Readily available and effective for most radioactive contamination.	Continued washing will abrade the skin.
Tide or other detergent (plain)	Skin and hands	Emulsifies, dissolves, and erodes.	Make into a paste. Use with additional water with a mild scrubbing action. Use care not to erode the skin.	Slightly more effective than washing with soap.	Will defat and abrade skin and must be used with care.
Mixture of 50% Tide and 50% cornmeal	Skin and hands	Emulsifies, dissolves, and erodes	Make into a paste. Use with additional water with a mild scrubbing action. Use care not to erode the skin.	Slightly more effective than washing with soap.	Will defat and abrade skin and must be used with care.

Area and Material Decontamination					
Method *	Surface	Action	Technique	Advantages	Disadvantages
Vacuum cleaning	Dry surfaces	Removes contaminated dust by suction	Use conventional vacuum technique with efficient filter.	Good on dry, porous surfaces. Ovoids water reactions.	All dust must be filtered out of exhaust. Machine is contaminated.
Water	All nonporous surfaces (metal, painted, plastic, etc.)	Dissolves and erodes	For large surfaces. Hose with high pressure water at an optimum distance of 15 to 20 feet. Spray vertical surfaces at an angle of incidence of 30° to 40°; work from top to bottom to avoid recontamination. Work upwind to avoid spray. Determine cleaning rate experimentally, if possible; otherwise, use a rate of 4 square feet per minute.	All water equipment may be utilized. allows operation to be carried out from a distance. Contamination may be reduced by 50%. Water equipment may be used for solutions of other decontaminating agents.	Drainage must be controlled. Not suitable for porous materials. Oiled surfaces cannot be decontaminated. Not applicable on dry contaminated surfaces (use vacuum); not applicable on porous surfaces such as wood, concrete, canvas, etc. Spray will be contaminated.
	All surfaces	Dissolve and erodes	For small surfaces Blot up liquid and handwipe with water and appropriate commercial detergent.	Extremely effective if done immediately after spill and on non-porous surfaces.	Of little value in the decontamination of large areas, longstanding contaminants and porous surfaces.
Steam	Nonporous surfaces (especially painted or oiled surfaces)	Dissolves and erodes	Work from top to bottom and from upwind. Clean surface at a rate of 4 square feet per minute. The cleaning efficiency of steam will be greatly increased by using detergent.	Contamination may be reduced approximately 90% on painted surfaces.	Steam subject to same limitations as water. Spray hazard makes the wearing of waterproof outfits necessary.
Detergents	Nonporous surfaces (metal, painted, glass, plastic, etc.)	Emulsifies contaminant and increases wetting power of water and cleaning efficiency of steam	Rub surface 1 minute with a rag moistened with detergent solution then wipe with dry rag; use clean surface of the rag for each application. Use a power rotary brush with pressure feed for more efficient cleaning. Apply solution from a distance with a pressure proportioned. Do not allow solution to drip onto other surface. Mist application is all that is necessary.	Dissolve industrial film and other materials which hold contamination. Contamination may be reduced by 90%.	May require personal contact with surface. May not be efficient on longstanding contamination.

Area and Material Decontamination (Continued)					
Method *	Surface	Action	Technique	Advantages	Disadvantages
Complexing agents	Nonporous surfaces (especially unweathered surfaces; i.e., no rust or calcareous growth)	Forms soluble complexes with contaminated material	Complexing agent solution should contain 3% (by weight) or agent. Spray surface with solution. Keep surface moist 30 minutes by spraying with solution periodically. After 30 minutes, flush material off with water. Complexing agents may be used on vertical and overhead surfaces by adding chemical foam (sodium carbonate or aluminum sulfate).	Holds contamination in solution. Contamination may be reduced by 75% in 4 minutes on unweathered surfaces. Easily stored; carbonates and citrates are nontoxic, noncorrosive.	Requires application for 5 to 30 minutes. Little penetrating power; of small value on weathered surfaces.
Organic solvents	Nonporous surfaces (greasy or waxed surfaces, paint or plastic finishes, etc.)	Dissolves organic materials (oil, paint, etc.)	Immerse entire unit in solvent or apply by wiping procedure (see Detergents).	Quick dissolving action. Recovery of solvent possible by distillation.	Requires good ventilation and fire precautions. Toxic to personnel. Material bulky.
Inorganic acids	Metal surfaces (especially with porous deposits; i.e., rust or calcareous growth); circulatory pipe systems	Dissolve porous deposits	Use dip-bath procedure for movable items. Acid should be kept at a concentration of 1 to 2 normal (9 to 18% hydrochloric, 3 to 6% sulfuric acid). Leave on weathered surfaces for 1 hour. Flush surface with water, scrub with a water-detergent solution, and rinse. Leave in pipe circulatory system 2 to 4 hours; flush with plain water, a water-detergent solution, then again with plain water.	Corrosive action on metal and porous deposits. Corrosive action may be moderated by addition of corrosion inhibitors to solution.	Personal hazard. Wear goggles, rubber boots, gloves, and aprons. Good ventilation required because of toxicity and explosive gases. Acid mixtures should not be heated. Possibility of excessive corrosion if used without inhibitors. Sulfuric acid not effective on calcareous deposits.
Acid mixtures:  Hydrochloric, sulfuric, acetic, citric acids, acetates, citrates	Nonporous surfaces (especially with porous deposits); circulatory pipe systems	Dissolves porous deposits	Same as for inorganic acids. A typical mixture consist of 0.1 gal. hydrochloric acid, 0.2 lb sodium acetate and 1 gal. water	Contamination may reduced by 90% in 1 hour (unweathered surfaces). More easily handled than inorganic acid solution.	Weathered surfaces may require prolonged treatment. Same safety precautions as required for inorganic acids.

Area and Material Decontamination (Continued)					
Method *	Surface	Action	Technique	Advantages	Disadvantages
Caustics: lye (sodium hydroxide) calcium hydroxide potassium hydroxide	Painted surfaces (horizontal)	Softens paint (harsh method)	Allow paint-remover solution to remain on surface until paint is softened to the point where it may be washed off with water. Remove remaining paint with long-handled scrapers. Typical paint remover solution: 10 gal. water, 4 lb lye, 6 lb. boiler compound, 0.75 lb. cornstarch.	Minimum contact with contaminated surfaces. Easily stored.	Personal hazard (will cause burns). Reaction slow; thus, it is not efficient on vertical or overhead surfaces. Should not be used on aluminum or magnesium.
Trisodium phosphate	Painted surfaces (vertical, overhead)	Softens paint (mild method)	Apply but 10% solution by rubbing and wiping procedure (see Detergent)	Contamination may be reduced to tolerance in one or two applications.	Destructive effective on paint. Should not be used on aluminum or magnesium.
Abrasion	Nonporous surfaces	Removes surfaces	Use conventional procedures, such as sanding, filing and chipping; keep surface damp to avoid dust hazard.	Contamination may be reduced to as low a level as desired.	Impracticable for porous surfaces because of penetration by moisture.
Sandblasting	Nonporous	Removes surfaces	Keep sand wet to lessen	Practical for large surface areas	Contamination spread over area must be removed.
Vacuum blasting	Porous and non- porous surfaces	Removes surface; traps and controls contaminated waste.	Hold tool flush to surface to prevent escape of contamination.	Contaminated waste ready for disposal. Safety abrasion method.	Contamination of equipment.

\* Begin with the first listed method and then proceed step by step to the more severe methods, as necessary.